



**JO-7**  
**Wildlife Hazard Management Plan**

**National Aeronautics and Space Administration**  
**Moffett Field, California 94035-1000**

**Code JO**  
**Flight Operations**  
**Aviation Management Office**

**CODE JO  
FLIGHT OPERATIONS  
AVIATION MANAGEMENT OFFICE  
MOFFETT FEDERAL AIRFIELD  
NASA AMES RESEARCH CENTER, CA**

Submitted \_\_\_\_\_

Date: \_\_\_\_\_

Roy A. Williams  
Chief of Aviation Management Office, Code JO

Concur \_\_\_\_\_

Date: \_\_\_\_\_

Michael R. Dudley  
Director of Safety, Environmental and Mission Assurance, Code Q

Approved \_\_\_\_\_

Date: \_\_\_\_\_

Deborah L. Feng  
Director of Center Operations, Code J

**Acronyms and Abbreviations**

AC	Advisory Circular
AFB	Air Force Base
AFSC/SEFW	Air Force Safety Center/Safety Flight Wildlife
AMO	Aviation Management Office
AOA	Airport Operations Area
APD	Ames Policy Directive
APR	Ames Procedural Requirements
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
BASH	Bird/Wildlife Aircraft Strike Hazard
BRAC	Base Realignment and Closure
BWHC	Bird/Wildlife Hazard Conditions
CA ANG	California Air National Guard
CDFG	California Department of Fish and Game
CDC	Centers for Disease Control and Protection
CFR	Code of Federal Regulations
Code J	Office of the Director of Center Operations
Code JO	Aviation Management Office
Code PFP	Plant Engineering Branch
Code Q	Safety, Environmental, and Mission Assurance Directorate
Code QE	Environmental Services Division
Code QH	Health and Safety Division
DOD	Department of Defense
DOI	Department of the Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FOD	Foreign Object Debris
HHS	Department of Health and Human Services

# WILDLIFE HAZARD MANAGEMENT PLAN

Rev 10/08

IAP	International American Products
IPM	Integrated Pest Management
MFA	Moffett Federal Airfield at NASA Ames Research Center
MIMP	Mitigation Implementation & Management Plan
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NADP	NASA Ames Development Plan
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NOTAM	Notice to Airmen
NWHC	National Wildlife Health Center
ROD	Record of Decision
RWOCB	Regional Water Quality Control Board
USAF	United States Air Force
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WS	Wildlife Services



**Table of Contents**

	<u>Page</u>
PREFACE	8
INTRODUCTION	8
1. WILDLIFE HAZARD ASSESSMENT	11
Current Wildlife Hazard Management	21
Summary of Current Wildlife Hazard Management	27
2. FAA APPROVAL	30
3. AUTHORITY	30
3.1 Program Authority	31
3.2 Grounds Maintenance	31
3.3 Active Harassment	32
3.4 Depredation	32
3.5 Reporting	32
4. INSPECTION OF MOVEMENT AREAS	33
4.1 Sweeps of Runways	33
4.2 Bird/Wildlife Hazard Condition Determinations	34
4.3 Bird Strike Reports	34
5. WILDLIFE CONTROL MEASURES	35
5.1 Vegetation	35
5.2 Pyrotechnics	36
5.3 Bioacoustics	37
5.4 Propane Cannons	37
5.5 Traps	38
5.6 Food Source Elimination	38
5.7 Rodenticides	39
5.8 Fumigants	40
5.9 Firearms	40
5.10 Other Wildlife Control Methods	40
6. COMMUNICATIONS	40
6.1 Harassment Operations	40
6.2 ATC	40
6.3 ATIS	41
6.4 NOTAM	41
7. REVIEW OF THE WILDLIFE MANAGEMENT PROGRAM	41

# WILDLIFE HAZARD MANAGEMENT PLAN

Rev 10/08

7.1	Aviation Safety Committee	41
7.2	Summary Report	42
7.3	Bird Hazard Working Group (BHWG)	42
Appendix 1	Moffett Federal Airfield Inspection and Wildlife Grid	43
Appendix 2	Air Force Wildlife Strike Report	44
Appendix 3	Feather Identification Lab - General Information	46
Appendix 4	Timeline of Activities at Moffett Federal Airfield at NASA Ames	47
Appendix 5	Deviations from CA ANG BASH Plan	48
Appendix 6	Wildlife Control Safety Plan	50
Appendix 7	NASA/CANG Agreement on Airfield Management	53
Map 1	Moffett Federal Airfield at NASA Ames	10
Figure 1	Wildlife observed by quarter, 2003-2004	15
Figure 2	Regional Area	19
Table 1	Nationwide civilian bird strikes for 1990-1999	12
Table 2	Hazard rankings of birds commonly involved in damaging strikes	14
Table 3	Bird Aircraft Strike Data	16

## **PREFACE**

The purpose of this plan is to establish guidelines to minimize aircraft exposure to potentially hazardous wildlife while assuring compliance with wildlife conservation laws, regulations, Federal Executive Orders (EO), and National Aeronautics and Space Administration (NASA) Ames Research Center policies and procedural requirements. This plan is not intended to cover every contingency that may arise or every rule of safety and good operating practice. The rules, procedures, and guidelines in this plan are to be considered as minimum standards. This plan should be used in conjunction with other governing directives, regulations, and procedures. This plan supersedes prior editions.

This plan is prepared in accordance with the guidelines established by the Federal Aviation Administration (FAA) for commercial air carrier airports under the provisions of Title 14 Code of Federal Regulations (CFR) Part 139.337.

When the need arises, special instructions or waivers will be issued by the Aviation Management Office (AMO) and any other affected directorate or agency concerned. Special instructions will be supplemental to this plan and will be considered as standard operating procedures. In due course, special instructions will either be incorporated into this manual or canceled. Deviations or waivers from this manual are authorized in emergencies or in situations where flight or ground safety might otherwise be compromised. Written documentation of deviations is required and must be transmitted to the AMO no later than 10 calendar days following any deviation from these guidelines.

This plan may be revised by new editions or updated by page changes or pen-and-ink corrections. When corrections or page changes are entered, the changes shall be annotated on the Record of Revisions page.

Comments and recommendations concerning this plan are encouraged and should be submitted to the Chief, AMO (Code JO). Extra copies of this plan can be obtained from the AMO.

## **INTRODUCTION**

Moffett Federal Airfield at NASA Ames is a restricted use Federal airfield owned by the National Aeronautics and Space Administration (NASA) and operated by the Chief; Aviation Management Office (AMO) to meet the needs of NASA, Resident Agencies, and other NASA Ames Research Center (NASA Ames) authorized users. The Navy, and at various times other military services, managed the airfield as a military airfield from the 1930s when Congress established the Naval Air Station (NAS) at Moffett Field in 1933 until 1994 when the Navy transferred ownership to NASA following a 1992 Base Realignment and Closure Act (BRAC) decision.

The Federal Aviation Administration (FAA) and the United States Air Force (USAF) have documented wildlife aircraft strike data nationally in the FAA National Wildlife Strike Database and the USAF wildlife strike database. The airfield and the California Air National Guard (CA ANG) have compiled data for wildlife strikes at Moffett Federal Airfield at NASA Ames. Prior to the 1994 BRAC transfer, the Navy had compiled bird-strike data for Moffett Federal Airfield at NASA Ames.

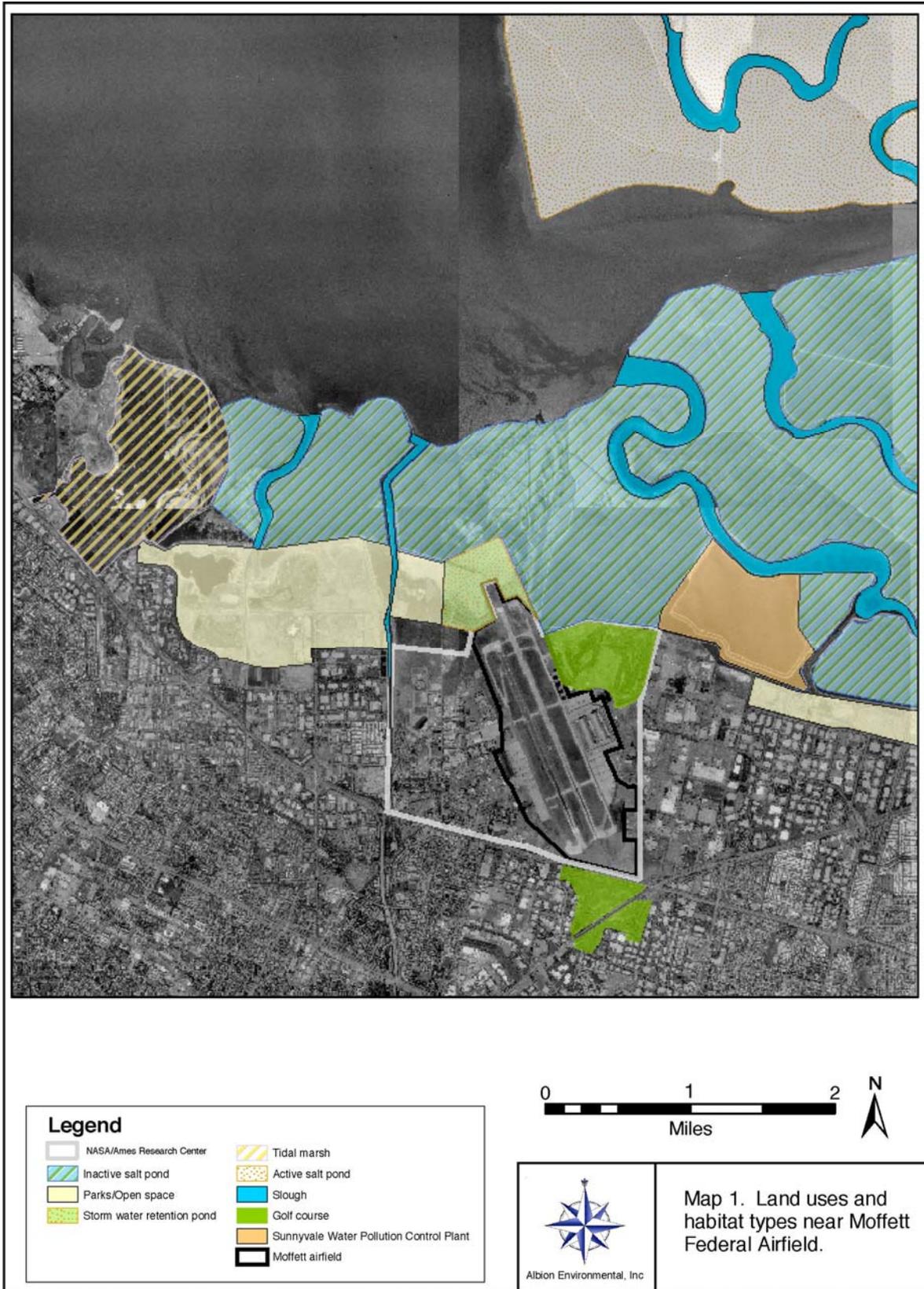
Because the CA ANG is one of the primary tenants on the airfield and is developing a Bird/Wildlife Aircraft Strike Hazard (BASH) Plan similar to the NASA Ames Wildlife Hazard Management Plan, the AMO reviewed both FAA guidance and USAF and Department of Defense (DOD) guidance. The USAF and DOD, of which the Air National Guard Bureau and CA ANG are a part, have signed several agreement documents with the U.S. Fish and Wildlife Service and other agencies regarding wildlife and wetlands conservation and hazard management. These include: the 2003 “Memorandum of Agreement (MOA) Between the Federal Aviation Administration, the U.S. Air Force, the U.S. Army, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture to Address Aircraft-Wildlife Strikes” and the 2006 “Memorandum of Understanding (MOU) Between the U.S. Department of Defense and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds.” The 2003 MOA incorporates the FAA Advisory Circular (AC) 150/5200-33, Hazardous Wildlife Attractants on or Near Airports, which was updated August 28, 2007. The USAF has since revised its guidance as USAF Pamphlet 91-212, Bird/Wildlife Aircraft Strike Hazard (BASH) Management Techniques (Feb. 1, 2004).

The NASA Ames AMO, in consultation with the NASA Ames Environmental Services Division, and upon review of wildlife strike data for airfields nationwide and at NASA Ames Moffett Federal Airfield, and FAA and USAF guidance documents for managing wildlife risk to aircraft, find that a potential for moderate to severe wildlife hazard exists at Moffett Federal Airfield at NASA Ames.

The primary risks at Moffett Federal Airfield at NASA Ames are associated with the airfields historic location in a grassy upland ecosystem adjacent to wetlands in the Pacific Flyway and with human activity at and in the vicinity of the airfield which attracts mammals, large bodied birds, and flocking birds posing severe to moderate risk of damage to aircraft and adverse effects on flight (Map 1).

In light of these risks, the NASA Ames AMO and the Environmental Services Division have implemented a variety of measures to reduce wildlife risk to aircraft at the airfield since the Navy transferred the airfield to NASA in 1994. Examples include habitat management and an active harassment program. Prior to the Navy’s transfer, the Navy leased the unpaved areas of the airfield to a farmer who tilled the land in a variety of crops including, for example, oats, following a list approved by the FAA to reduce wildlife hazards to aviation. Prior to establishment of the airfield by the Navy in the 1930’s, the land was managed as part of a 500,000 acre ranch.

The purpose of this document, therefore, is to establish recommended measures as guidelines to minimize aircraft exposure to potentially hazardous wildlife while assuring compliance with wildlife and wetland conservation laws, regulations, Federal Executive Orders (EO), and NASA Ames policy directives (APD) and procedural requirements (APR).



Map 1 Moffett Federal Airfield at NASA Ames

**1. WILDLIFE HAZARD ASSESSMENT**

The FAA National Wildlife Strike Database provides information on the 47,212 reported wildlife strikes at airfields in the United States during the period 1990 through 2003. Data for strikes that caused damage to one or more aircraft or had an adverse effect on an aircraft's flight can be seen in Table 1. Using these data, FAA created a hazard ranking for different types of wildlife based on degree of damage to aircraft and effect on flight (see Table 2) (FAA AC 150/5200-33B, Hazardous Wildlife Attractants On or Near Airports, dated Aug. 28, 2007).

On a scale of 1 (lowest risk) to 100 (greatest risk), large mammals, such as deer (100), and large bodied birds, such as vultures (64), geese (55), eagles (41) and ducks (39) present the most severe risk to aircraft. Owls, which vary greatly by species from pygmy to great horned owls, were rated at 23 as a group. Flocking birds, such as gulls (24), pigeons (23), and doves (14) and grassy passerines, such as horned larks (17), meadowlarks (7), and swallows (4), present a moderate to severe risk. Crows and ravens were rated 16, kestrels rated a 9 and shorebirds rated a (10). In 2003, the FAA, USAF, US Army, US Environmental Protection Agency (USEPA), US Department of Agriculture (USDA), and USFWS signed the Memorandum of Agreement (MOA) referenced earlier to address aircraft-wildlife strikes based on these data.<sup>1</sup>

---

<sup>1</sup> The MOA between the FAA, USAF, US Army, USEPA, USFWS, and USDA to Address Aircraft-Wildlife Strikes (2003) adopted the following definition of an aircraft-wildlife strike as when 1) a pilot reports that an aircraft struck 1 or more birds or other wildlife; 2) aircraft maintenance personnel identify aircraft damage as having been caused by an aircraft-wildlife strike; 3) personnel on the ground report seeing an aircraft strike 1 or more birds or other wildlife; 4) bird or other wildlife remains, whether in whole or in part, are found within 200 feet of a runway centerline, unless another reason for the animal's death is identified; or 5) the animal's presence on the airport had a significant, negative effect on a flight (i.e., aborted takeoff, aborted landing, high-speed emergency stop, aircraft left pavement area to avoid collision with animal) (Wildlife Control Procedures Manual, Technical Publication 11500E, 1994).

Table 1 from the MOA lists “Identified wildlife species or groups that were involved in two or more aircraft-wildlife strikes, that caused damage to one or more aircraft components; or that had an adverse effect on an aircraft’s flight. Data are for 1990-1999 and involve only civilian, U.S. aircraft.”

Table 1.

<b>Birds</b>	<b>No. reported strikes</b>
Gulls (primarily ring-billed)	874
Geese (90 % Canada geese)	458
Hawks (90 % red-tailed hawks)	182
Ducks (primarily mallards)	166
Vultures (93 % turkey vulture)	142
Rock doves	122
Doves (primarily mourning doves)	109
Blackbirds	81
European starlings	55
Sparrows	52
Egrets	41
Shorebirds (primarily killdeer & sandpipers)	40
Crows	31
Owls	24
Sandhill cranes	22
American kestrels	15
Great blue herons	15
Pelicans	14
Swallows	14
Eagles (bald and golden)	14
Ospreys	13
Ring-necked pheasants	11
Hérons	11
Barn owls	9
American robins	8
Meadowlarks	8
Buntings (snow)	7
Cormorants	6
Snow buntings	6
Brants	5
Terns (all spp.)	5
Great horned owls	5
Horned larks	4
Turkeys	4
Swans	3
Mockingbirds	3
Quails	3
Homing pigeons	3
Snowy owls	3
Aningas	2
Ravens	2
Kites	2

# WILDLIFE HAZARD MANAGEMENT PLAN

Rev 10/08

Falcons	2
Peregrine falcons	2
Merlins	2
Grouse	2
Hungarian partridges	2
Spotted doves	2
Thrushes	2
Mynas	2
Finches	2

**Total known birds** **2,612**

## **Mammals**

Deer (primarily white tailed)	285
Coyotes	16
Dogs	10
Elk	6
Cattle	5
Bats	4
Horses	3
Pronghorn antelope	3
Fox	2
Raccoon	2
Rabbits	2
Moose	2

**Total known mammals** **340**

Table 2. Ranking of 25 species groups as to relative hazard to aircraft (1=most hazardous) based on three criteria (damage, major damage, and effect-on-flight), a composite ranking based on all three rankings, and a relative hazard score. Data were derived from the FAA National Wildlife Strike Database, January 1990–April 2003.<sup>1</sup>

Ranking by criteria					
Species group	Damage <sup>4</sup>	Major damages <sup>5</sup>	Effect on flight <sup>6</sup>	Composite ranking <sup>2</sup>	Relative hazard score <sup>3</sup>
Deer	1	1	1	1	100
Vultures	2	2	2	2	64
Geese	3	3	6	3	55
Cormorants/pelicans	4	5	3	4	54
Cranes	7	6	4	5	47
Eagles	6	9	7	6	41
Ducks	5	8	10	7	39
Osprey	8	4	8	8	39
Turkey/pheasants	9	7	11	9	33
Hérons	11	14	9	10	27
Hawks (buteos)	10	12	12	11	25
Gulls	12	11	13	12	24
Rock pigeon	13	10	14	13	23
Owls	14	13	20	14	23
H. lark/s. bunting	18	15	15	15	17
Crows/ravens	15	16	16	16	16
Coyote	16	19	5	17	14
Mourning dove	17	17	17	18	14
Shorebirds	19	21	18	19	10
Blackbirds/starling	20	22	19	20	10
American kestrel	21	18	21	21	9
Meadowlarks	22	20	22	22	7
Swallows	24	23	24	23	4
Sparrows	25	24	23	24	4
Nighthawks	23	25	25	25	1

<sup>1</sup> Excerpted from the *Special Report for the FAA, "Ranking the Hazard Level of Wildlife Species to Civil Aviation in the USA: Update #1, July 2, 2003"*. Refer to this report for additional explanations of criteria and method of ranking.

<sup>2</sup> Relative rank of each species group was compared with every other group for the three variables, placing the species group with the greatest hazard rank for  $\geq 2$  of the 3 variables above the next highest ranked group, then proceeding down the list.

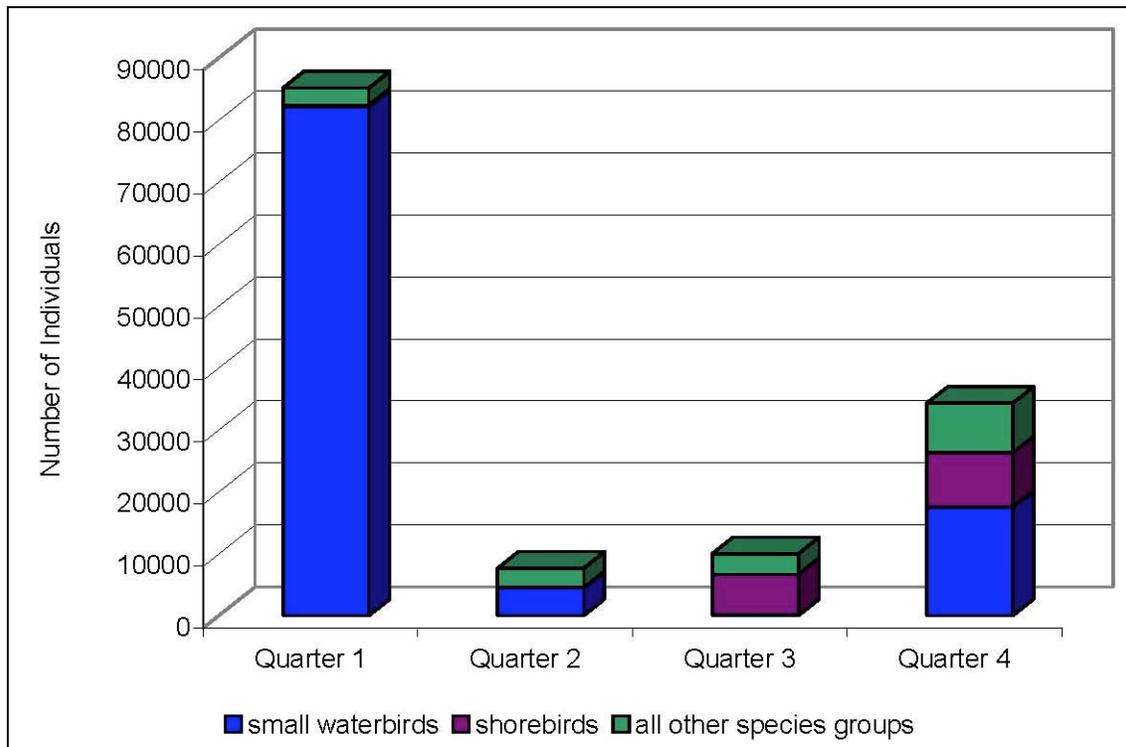
<sup>3</sup> Percentage values, from Tables 3 and 4 in Footnote 1 of the *Special Report*, for the three criteria were summed and scaled down from 100, with 100 as the score for the species group with the maximum summed values and the greatest potential hazard to aircraft.

<sup>4</sup> Aircraft incurred at least some damage (destroyed, substantial, minor, or unknown) from strike.

<sup>5</sup> Aircraft incurred damage or structural failure, which adversely affected the structure strength, performance, or flight characteristics, and which would normally require major repair or replacement of the affected component, or the damage sustained makes it inadvisable to restore aircraft to airworthy condition.

<sup>6</sup> Aborted takeoff, engine shutdown, precautionary landing, or other.

Many of the types of wildlife identified in the 2003 MOA and the FAA AC occur at Moffett Federal Airfield at NASA Ames. In 2003, NASA contracted with Albion Environmental, Inc., for a yearlong assessment of wildlife hazards at and near Moffett Federal Airfield at NASA Ames. The results of that survey are on file at the AMO. Figure 1 displays data on observed wildlife at the airfield by calendar year quarter. Small waterbird populations tended to increase during October to December and spike from January through March. Shorebird populations increased in the late summer and fall. Other species were present in relatively small numbers throughout year, increasing in the fall.



**Figure 1. Small waterbirds, shorebirds, and all other wildlife observed by calendar year quarter, 2003-2004 (Albion 2004).**

Table 3 depicts bird strikes at Moffett Federal Airfield at NASA Ames as reported to the FAA and the USAF, Bird Aircraft Strike Hazard (BASH) Team, AFSC/SEFW, Kirtland AFB for the period from June 2000 through December 2007. Additional data from 1986 to 2004 are available in the Albion report (2004). Changing missions from Navy operations to NASA and resident agency operations at the airfield in 1994 have impacted reporting procedures. From 1986 to 1994, when the Navy operated the airfield, most bird aircraft strikes involved P-3's. Since 1994, when the Navy transferred the airfield to NASA, strikes have involved mostly C-130's. In most reports since 1994, the wildlife species is identified.

# WILDLIFE HAZARD MANAGEMENT PLAN

Rev 10/08

### Table 3. Bird Aircraft Strike Data

Date	Aircraft	Time	Airspeed KIAS	Altitude AGL	Phase of Operation	Common Name	Notes
07-Jun-00	MC130P	1615	115	0	TAKEOFF	California Gull	FUSELAGE / ANTENNA / SKIN, PROPELLER, WING / ROTOR
07-Jun-00	MC130P	1345	110	0	GO-AROUND	Cliff Swallow	
13-Jun-00	MC130P	2041	210	1000	CRUISE LOW LEVEL	UNKNOWN	RADOME/NOSE, WINDSHIELD/CANOPY, WING/ROTOR
13-Jun-00	MC130P				UNKNOWN	Barn Swallow	
17-Jul-00	FXWG	1600			UNKNOWN	American Kestrel	AIRCRAFT INVOLVED IS NOT KNOWN. VMGR 352 HAD TWO C-130S DEPART JUST PRIOR TO THE BIRD BEING FOUND ON THE RUNWAY.
26-Jul-00	T-38A	0955	155	0	TAKEOFF	UNKNOWN	WILDLIFE FOUND ON RUNWAY
14-Oct-00	MC130P	1055	115	30	INITIAL CLIMB	Horned Lark	FUSELAGE / ANTENNA / SKIN
17-Oct-00	MC130P	750	115	0	TAKEOFF	Yellow-rumped Warbler	RADOME / NOSE
04-Jun-01	HC130N	1025	115	25	INITIAL CLIMB	California Gull	
14-Jun-01	FXWG	900			UNKNOWN	California Gull	WILDLIFE FOUND ON RUNWAY (AIRCRAFT STRUCK UNKNOWN)
19-Jun-01	C-5C	1930			UNKNOWN	UNKNOWN	FEATHERS AND BLOOD RETRIEVED FOR NOSE
25-Jun-01	FXWG				UNKNOWN	Cliff Swallow	WILDLIFE FOUND ON RUNWAY (AIRCRAFT STRUCK UNKNOWN)
11-Jul-01	FXWG	800			UNKNOWN	Cliff Swallow	WILDLIFE FOUND ON RUNWAY (AIRCRAFT STRUCK UNKNOWN)
15-Jul-01	MC130P	1110	100	5	LANDING	American Kestrel	
23-Oct-01	MC130P	1400	105	0	GO-AROUND	UNKNOWN	ECM PODS / PYLONS, RADOME / NOSE
06-Nov-01	MC130P	1500			LANDING	Western Meadowlark	

# WILDLIFE HAZARD MANAGEMENT PLAN

Rev 10/08

Date	Aircraft	Time	Airspeed KIAS	Altitude AGL	Phase of Operation	Common Name	Notes
20-Dec-01	MC130P	1515	105	0	GO-AROUND	UNKNOWN	PROPELLER
30-May-02	P-3C	1700	0	0	UNKNOWN	California Gull	WILDLIFE FOUND ON RUNWAY (AIRCRAFT STRUCK UNKNOWN)
11-Sep-02	UNKW				UNKNOWN	American Kestrel	WILDLIFE FOUND ON RUNWAY (AIRCRAFT STRUCK UNKNOWN)
11-Sep-02	UNKW				UNKNOWN	Mourning Dove	
01-Apr-03	MC130P	1630	180	UNKW	ENROUTE	Barn Swallow/ Swallow	RADOME / NOSE
28-May-03	MC130P	1815	100	0	GO-AROUND	California Gull	TAIL / STABILIZER / RUDDER
12-Nov-03	MC130P	2050	125	100	APPROACH-FINAL	Ring-billed Gull	FUSELAGE / ANTENNA / SKIN, OTHER (SPECIFY IN REMARKS)
08-Jan-04	MC130P	2215	109	300	APPROACH-FINAL	Perching Birds	FUEL TANKS, WING / ROTOR
10-Mar-04	C130T	1330	UNKW	UNKW	GO-AROUND	Red-tailed Hawk	PROPELLER - AIRCRAFT FROM VR-55
01-May-04	C130H	1015	100	0	TAKEOFF	UNKNOWN	RADOME / NOSE, OTHER (SPECIFY IN REMARKS)
22-Jun-04	HC130P	1500	130	0	LANDING	Rock Dove/Pigeon	OUTSIDE ENGINE NO. 4
10-Jul-04	FXWG	1200	UNKW	UNKW	TAKEOFF	Rock Dove/Pigeon	B-737 AIRCRAFT FROM VR-59 -- 20 INDIVIDUAL BIRDSTRIKES INSIDE ENGINE NO. 1 AND ON LEFT WING.
11-Jul-04	MC130P	835	100	0	LANDING	Rock Dove/Pigeon	FUEL TANKS, FUSELAGE / ANTENNA / SKIN, INSIDE ENGINE NO. 2, INSIDE ENGINE NO. 3, LANDING GEAR, LIGHTS, OUTSIDE ENGINE NO. 2, OUTSIDE ENGINE NO. 3, PROPELLER, RADOME / NOSE, TAIL / STABILIZER / RUDDER, WINDSHIELD / CANOPY, and WING / ROTOR

# WILDLIFE HAZARD MANAGEMENT PLAN

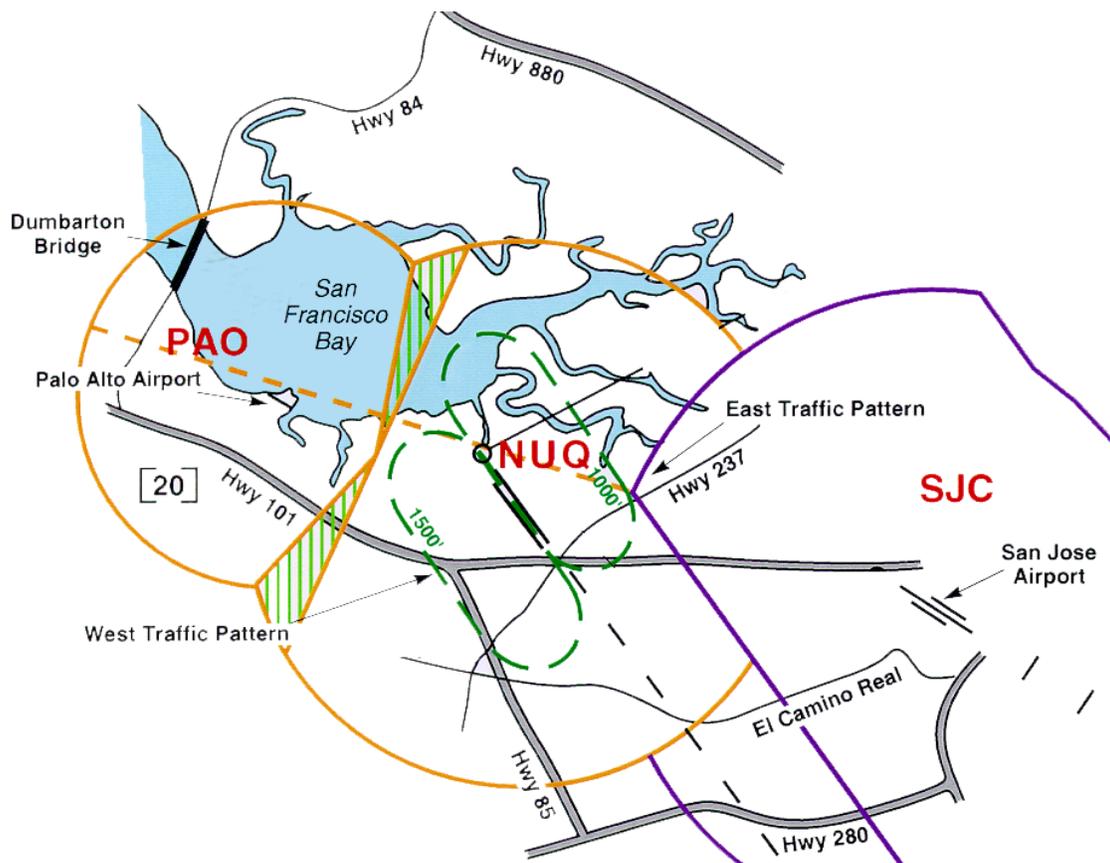
Rev 10/08

Date	Aircraft	Time	Airspeed KIAS	Altitude AGL	Phase of Operation	Common Name	Notes
15-Oct-04	UNKW				UNKNOWN	Barn Owl	TOWER REPORTED AN INJURED BIRD ON RUNWAY
07-Oct-04	UNKW				UNKNOWN	Skunk	FOUND DEAD ON 32R
21-Oct-04	MC130P	2200	120	100	TAKEOFF	California Gull	FUEL TANKS
08-Dec-04	MC130P	1900	140	300	APPROACH-FINAL	Western Meadowlark	FUEL TANKS, OUTSIDE ENGINE NO. 2
7-Nov-05	C130	1052	UNKW	UNKW	TAKEOFF	Western Meadowlark	CARCASS RECOVERED FROM 32R
14-Nov-05	UNKW				UNKNOWN	Burrowing Owl	WILDLIFE FOUND ON RUNWAY (AIRCRAFT STRUCK UNKNOWN)
27-Jun-06	C130H	1345	UNKW	UNKW	LANDING	Red-tailed Hawk	STRIKE SEVERED WING OF HAWK. RECOVERED FROM RUNWAY BY CODE Q.
18-Oct-06	UNKW				UNKNOWN	Western Meadowlark	WILDLIFE FOUND ON RUNWAY (AIRCRAFT STRUCK UNKNOWN)
23-Oct-06	C130	1801	120	50	INITIAL CLIMB	Western Meadowlark	BIRD FLUIDS FOUND ON NO. 4 PROPELLER NASA PERSONAL FOUND CARCASS ON RUNWAY
03-Jan-07	UNKW				UNKNOWN	Mallard	WILDLIFE FOUND ON 32R OVERRUN (AIRCRAFT STRUCK UNKNOWN)
26-Feb-07	UNKW				UNKNOWN	Barn owl	MANGELED BIRD RECOVERED FROM 32R
03-Apr-07	UNKW				UNKNOWN	Short-eared owl	TWO WINGS FOUND ON 32R AT CHARLIE
21-May-07	UNKW				UNKNOWN	California Gull	WILDLIFE FOUND ON 32R JUST NORTH OF ALPHA (AIRCRAFT STRUCK UNKNOWN)
22-MAY-07	UNKW				UNKNOWN	California Gull	RECOVERED FROM 32L NEAR BRAVO (AIRCRAFT STRUCK UNKNOWN)
01-JUN-07	UNKW				UNKNOWN	Barn owl	WILDLIFE FOUND ON 32R JUST NORTH OF ALPHA (AIRCRAFT STRUCK UNKNOWN)
12-JUN-07	MC-130P	1650	115	0	TOUCH & GO	UNKNOWN	
09-Jul-07	T-38C	1632	170	50	TAKEOFF INITIAL CLIMB	Barn Swallow	#2 ENGINE LOST ALL THRUST, MISSION TERMINATED, HEAVYWEIGHT

# WILDLIFE HAZARD MANAGEMENT PLAN

Rev 10/08

							SINGEL-ENGINE LANDING.
27-JUL-07	C-130	1430	130	30	LANDING FLARE/ROLL-OUT	UNKNOWN	SMALL BIRD IMPACT RIGHT SIDE OF FUSELAGE, BELOW COPILOTS SEAT.
02-AUG-07	UNKW				UNKNOWN	American Kestrel	WILDLIFE FOUND ON 32R ON SOUTH END (AIRCRAFT STRUCK UNKNOWN)
07-SEP-07	UNKW				UNKNOWN	Opossum	WILDLIFE FOUND ON 32R SOUTH OF CHARLIE (AIRCRAFT STRUCK UNKNOWN)
05-OCT-07	UNKW				UNKNOWN	Hermit Thrush	WILDLIFE FOUND ON 32R AT 3,500 FT REMAINING (AIRCRAFT STRUCK UNKNOWN)
03-NOV-07	B-767	1609			LANDING	UNKNOWN	SMALL FLOCK OBSERVED BY PILOT. NO DAMAGE AND NO REMAINS RECOVERD.



**Figure 2 Regional Area**

Although the data in Table 3 for July 2000 to December 2007 do not indicate where each strike occurred, the data indicate the phase when each strike occurred, e.g., landing, take-off, en route. Aircraft typically land at Moffett Federal Airfield at NASA Ames from the south heading north on the 32 heading and depart the airfield heading north, consistent with air traffic patterns around San Jose International Airport, Palo Alto Airport, and San Francisco International Airport (Figure 2).

At airfields generally, more strikes are reported during landing phases of flight due to the shallow angle of landing profiles and the longer exposure of the aircraft to birds at lower altitudes. However, using the flight phase information and not taking into account the strikes at unknown phases, the data indicate that strikes during take off and landing at Moffett Federal Airfield at NASA Ames were nearly equal. Given that strikes nationwide are typically lower during landing, this pattern suggests that there may be a relatively higher number of birds at that north end of the runways at the airfield. The north end of the runway is a much closer to the Bay, the NASA Ames Golf Course, and wetland habitats on the airfield.

The data during the period of June 2000 through December 2007 indicate that bird strikes tend to occur most often in June (12), July (8) and October (9). The birds most commonly struck during these months included: swallows (5), gulls (4), doves (3), larks (3) and kestrels (3).

FAA and USAF guidance documents further identify habitat conditions and human activities that tend to attract wildlife with known risks to aircraft. The major factor is associated with the airfield's geographic location in the South San Francisco Bay area and proximity to land uses attractive to hazardous wildlife (Map 1).

The airfield is located in a wetland to grassy upland ecosystem adjacent to the San Francisco Bay and within the Pacific Flyway. Flight patterns subject the airfield to seasonal hazards associated with migratory bird activity. The San Francisco Bay, associated wetlands, the Don Edwards San Francisco Bay National Wildlife Refuge, drainage channels, local storm water retention and water treatment ponds, and ponds at golf courses and parks located near the airfield attract waterfowl, shorebirds and other wildlife. During winter months, rainwater pools on the airfield, attracting waterfowl and shorebirds. During periods of inclement weather, coastal birds may seek refuge inland at the airfield. The grassy areas provide habitat for a variety of wildlife, including small rodents such as mice and insects, which in turn provide prey for wildlife that may be hazardous to aircraft. Trees and other types of structures provide perches for flocking birds and larger birds such as raptors.

Several golf courses and many parks are also located near the airfield and attract Canada geese and other wildlife. For example, the NASA Ames Golf Course is located on a former landfill adjacent to the airfield, and Shoreline Golf Course is located nearby in the City of Mountain View. Across US 101 to the south of the airfield, NASA owns several holes at the City of Sunnyvale Golf Course and pays the City to top trees to maintain the clear zone and support approach lighting systems to the south of the runway.

Artificial food sources, such as landfills, dumpsters, and artificial feeding stations also attract wildlife, some of which are hazardous to aircraft or attract wildlife, such as rodents, that attract wildlife hazardous to aircraft. Two municipal solid waste landfills are located east of the airfield near Milpitas and a smaller landfill is located within the five-mile radius

in Palo Alto. The City of Sunnyvale also operates a trash recycling facility northeast of the airfield. These facilities can attract thousands of gulls. Dumpsters at NASA Ames, if not kept covered, attract wildlife that may be hazardous to aircraft or that provide prey for wildlife that are hazardous to aircraft. Similarly, employee feeding of feral cats and pigeons, which has been prohibited at NASA Ames, attracts wildlife that are hazardous to aircraft.

### **Current Wildlife Hazard Management**

A variety of practices to reduce wildlife hazards to aircraft are currently practiced at NASA Ames. These and FAA and USAF recommendations are described below by type of wildlife.

The AMO, through the USDA Wildlife Services, is implementing an active harassment program. Active harassment is conducted for most species. A US Fish and Wildlife Service depredation permit was obtained that allows the lethal take, as necessary, of numerous migratory bird species.

#### **Large Mammals**

Deer, Cougar, Coyotes, Fox: Among animals known to pose the greatest risk to aircraft due to size are deer. Deer are the most commonly reported wildlife struck. In 2007 a deer was spotted at the north end of the airfield. An unverified mountain lion sighting has also been reported. Coyotes have been reported as well. Grey and red foxes have been observed on the airfield. USAF guidelines recommend controlling vegetation (e.g., broad-leaf weeds, shrubs, and trees), installing fencing, conducting active harassment, and controlling rodents, rabbits, and other food sources. The number of large mammals at the airfield is low, and no strikes have been reported at the airfield. Therefore, the AMO and the NASA Ames Environmental Services division are continuing to monitor the sightings.

Black-tailed jackrabbit: Black-tailed jackrabbits are common at the airfield. These large bodied hares present a hazard to aircraft and attract raptors that also present a high risk to aircraft. For rabbits and hares in general, the USAF recommends proper grass management, trapping, poisoning, and lethal removal. The AMO has contracted with the USDA Wildlife Services who lethally remove jackrabbits when observed on the airfield. Black tailed jackrabbits are protected as a game species under California law; however, no permit is needed under California Department of Fish and Game (CDFG) Code Section 4152.

### Heavy-bodied Birds

**Vultures:** Heavy-bodied birds, such as vultures, have been observed at the airfield. Vultures are scavengers and often soar on mid-day thermals in search of food. The USAF recommends removing dead animals from the airfield to avoid attracting vultures.

**Canada Geese:** Geese, being large bodied, also pose a high hazard to aircraft in a strike. Canada geese occasionally occur on the airfield and at the NASA Ames Golf Course. Geese are also resident at nearby golf courses, wetlands, and parks and move among these sites. Aside from removing these land uses, the USAF recommends steepening banks and removing vegetation along water bodies, avoiding grain crops and implementing active harassment especially to disperse resident geese that may attract migratory geese. The USFWS has issued regulations, guidance, and an Environmental Impact Statement on managing resident Canada geese (see <http://www.fws.gov/migratorybirds/>). The CDFG recommends integrated approaches where the western pond turtle occurs.

The AMO, in conjunction with the NASA Exchange, which manages the NASA Ames Golf Course, uses pyrotechnics to disperse geese from the airfield, NASA Ames Golf Course and Sunnyvale Golf Course. The NASA Ames Environmental Services Division, in coordination with the AMO and NASA Ames Exchange, is coordinating with counterparts at golf courses, airfields, and parks in the region to monitor the overall population of geese and the success of various techniques, and has commented extensively on the proposed South San Francisco Bay Salt Pond Restoration Project led by the Bay Conservation and Development Commission, USFWS, and California Coastal Conservancy, and the Shoreline Study led by the US Army Corps of Engineers.

**Eagles:** Eagles, being large bodied, pose a risk to aircraft. One or two golden eagles have been observed on the airfield. Eagles are active during the day and prefer feral cats and jackrabbits, but will prey on ground squirrels. An additional depredation permit is required from the USFWS to harass eagles. No lethal take is authorized under this permit. The USAF recommends managing perching sites and using pyrotechnics and radio-controlled airplanes. The AMO has been reducing perching sites and has employed an active harassment program. The Environmental Services Division has developed and is implementing a feral cat management plan and is developing a tree and ground squirrel management plan.

**Raptors:** Other raptors in addition to eagles have been observed on the airfield and prey on primarily on mice, insects, and lizards common to grassland environments. Red-tailed hawks and American kestrels are the most common species seen. Red-tailed hawks prefer mice, insects, and lizards, but will prey on ground squirrels and on burrowing owls especially when a burrowing owl is distracted, for example, by nestlings or displaced from its territory. Kestrels are small raptors, weighing 100 grams, and prey on mice rather than burrowing owls which are 50 percent larger or ground squirrels which are 5 to 6 times larger. The USAF recommends managing rodent populations, removing perches and active harassment. The AMO uses a variety of techniques to control ground squirrels and jackrabbits occurring on the airfield. The NASA Ames Environmental Services Division, in coordination with Logistics, the NASA Exchange, Plant Engineering, and the AMO are developing a Center-wide tree and ground squirrel management plan to augment the integrated pest management plan. The AMO is reducing perching sites, and the USDA is

employing pyrotechnics. Problem raptors can be captured and relocated in accordance with the USFWS depredation permit and the CDFG code.

Gulls: According to the USAF Pamphlet 91-212, gulls pose the most significant bird strike hazard to aircraft worldwide. Gulls prefer flat, open ground and are omnivorous. Gulls are most active just after sunrise and before sunset. The USAF recommends managing food waste, maintaining grass height between 7 and 14 inches, harassment with pyrotechnics and grasshopper control. The USAF notes that establishing and maintaining a uniform cover of this type will be difficult without irrigation in drier climates. The AMO is using a combination of tools (discing, herbicides, seeding, and mowing) to establish the recommended grass cover within the climate and resource constraints at the airfield. The AMO, through the USDA Wildlife Services, is implementing an active harassment program using pyrotechnics to disperse gulls, and several NASA Ames organizational units are implementing food waste management controls.

Owls: Most owls are nocturnal and attracted to rodents, preferring small rodents to other birds or raptors. Short eared owls and barn owls that occur at the Airfield are nocturnal and prefer mice, insects, lizards, pigeons, and cats. The USAF recommends removing perch sites and controlling rodents. The USAF notes that owls, such as barn owls, hunting in hangars can drastically reduce pigeon populations. A birdstrike with a flock of pigeons occurred at the Airfield that caused substantial damage to the aircraft. NASA has developed and is implementing a policy against feeding of feral cats and pigeons, a tree and ground squirrel management plan, a feral cat management plan, and a policy against leaving dumpsters open.

Burrowing owls are very small owls that are approximately 9 inches tall and weigh 5 ounces. These owls are common residents at airfields in the western United States, occupying small mammal burrows, and hunting insects, reptiles, and small rodents, particularly in the early morning and late evening. Burrowing owls live in colonies, have relatively small territories and high nest affinity. Burrowing owls prefer short grass habitats. Individual owls generally fly from 10 to 15 feet above the ground and hover to catch insects.

Western burrowing owls (*Athene cunicularia hypugaea*) are a California Species of Special Concern because the California Department of Fish and Game (CDFG) has identified the species as being at risk of becoming listed under the California Endangered Species Act (California ESA). Therefore, the CDFG has issued guidance for giving greater consideration to its conservation, especially on public lands (see <http://www.dfg.ca.gov/wildlife/species/ssc/index.html> and Memorandum on Staff Report on Burrowing Owl Mitigation, issued by the CDFG, October 17, 1995, for use in reviewing projects, for example, under the California Environmental Quality Act). The western burrowing owl is also identified by the USFWS Sacramento Office as a Federal Species of Concern. The designation of Federal Species of Concern is an informal term applied by the USFWS to List 2 Candidate Species, a category formerly used by the USFWS. Designation as a Federal Species of Concern does not necessarily mean that a species will be listed as a threatened or endangered species under the Federal ESA.

The USAF, in its guidance documents, recommends discouraging burrowing owls from taking up residency on airfields. Therefore, the NASA Ames Environmental Services Division, in coordination with the AMO and the USDA Wildlife Services, conducts surveys

by a qualified wildlife specialist with expertise in burrowing owl management, bands individual birds, passively relocates individuals from the Airfield outside of nesting season with a priority on the safety zone and approaches, constructs at least three artificial burrows in designated owl preserves and other available non-airfield habitat at NASA Ames for each burrowing owl relocated, and is studying alternative artificial burrow methodology. In the owl preserves, the Plant Engineering Division maintains grass at a short height using a light mower after surveying for active owl burrows.

DOD is conducting research on burrowing owl management at military airfields. As research results become available, the AMO in coordination with the Environmental Services Division will review the wildlife management plan.

Burrowing owls will be managed according to the Burrowing Owl Management Plan in the NASA Ames Development Plan Programmatic Environmental Impact Statement and Record of Decision (2002).

**Ducks and Other Waterfowl:** Ducks and other waterfowl, which tend to be heavy bodied, pose a significant risk to aircraft. Risk reduction measures include vegetation, water depth, and channel slope management. Active harassment is conducted with addition efforts focused to the storm water retention ponds. NASA Ames, through the Environmental Services Division, in coordination with the AMO, have been actively participating in the USFWS, Bay Conservation and Development Commission, and California Coastal Conservancy led South San Francisco Bay Salt Pond Restoration Project and in the Army Corps of Engineers led Shoreline Study for management of wetlands and water bodies to the north of the airfield.

#### Flocking Birds

**Shorebirds:** Shorebirds pose a significant risk when occurring in large numbers or flocking in tight groups, particularly during migration and along coastlines. The USAF recommends avoiding operations in the vicinity of large flocks, managing grass height, eliminating puddles, and steepening ditch banks. At the airfield, pools of rainwater occur during the winter, particularly at the north end of the runways. This end of the runway has subsided in recent years. Further, several Federally designated seasonal wetlands occur toward the north end of the airfield. Toward the mid-field, the drain tiles may be broken. The NASA Ames Environmental Services Division, in coordination with Facilities Engineering and Plant Engineering, has taken steps to improve drainage of the runways by halting the subsidence. The offices are also engaged with Federal, State and local agencies in assuring levees are adequate to protect the airfield from sea level (and associated ground water) rise. The AMO has increased active harassment after heavy rainstorms. Further, NASA Ames through the Environmental Services Division, in coordination with the AMO, have been actively participating in the USFWS, Bay Conservation and Development Commission, and California Coastal Conservancy led South San Francisco Bay Salt Pond Restoration Project and in the Army Corps of Engineers led Shoreline Study for wetlands and water bodies to the north of the airfield.

**Pigeons and Doves:** Structures, such as fences, power lines, towers, and lights, at the airfield provide perches that attract birds, such as doves and pigeons. The USAF recommends reducing perches or installing deterrents. NASA Ames Environmental

Services Division-initiated efforts to control employee feeding of pigeons has been successful. NASA Ames is reducing perches, largely by installing deterrents where feasible.

**Crows and Ravens:** Crows and ravens are medium bodied birds that can occur in large flocks. Crows and ravens are attracted to garbage and open, grassy areas for foraging in close proximity to trees for roosting. The USAF recommends managing grass height, removing known roosting sites, managing food waste, and employing bioacoustics and pyrotechnics. The NASA Ames Environmental Services Division, Logistics, and Plant Engineering are actively implementing controls to minimize waste food availability. The AMO has an active harassment program.

**Grassy Passerines:** Among animals known to pose moderate risk to aircraft, grassland passerines, such as larks, are attracted to the grassy upland areas. The USAF nationwide recommendations include maintaining a dense, uniform grass cover, with grass height between 7 and 14 inches, eliminating broad leaf weeds and perching sites to discourage meadowlarks, and seeding bare spots or coating with an oil base cover to discourage horned larks. The USAF notes that maintaining this type of grass cover, especially a uniform cover, will be very difficult in the Southwest without irrigation, and therefore also recommends persistent use of pyrotechnics. The AMO has been implementing vegetation management and, in coordination with the Environmental Services Division and Plant Engineering, is experimenting with different seed and mowing regimes. The AMO, through the USDA Wildlife Services, is also implementing an active harassment program.

**Swallows:** Although the USAF considers swallows generally good at avoiding aircraft, the USAF recommends employing active harassment and washing mud nests when swallows are beginning to build them near the airfield. The AMO is implementing an active harassment program.

**Blackbirds, cowbirds, and starlings:** These species occur at NASA Ames and are considered particularly hazardous because they tend to flock in large numbers. The USAF recommends maintaining grass height between 7 and 14 inches, controlling for seed-producing weeds and grain crops, eliminating roosting sites, and employing bioacoustics and pyrotechnics. The AMO, in coordination with the Environmental Services Division and Plant Engineering, is experimenting with different types of seed and mowing regimes. The AMO, in coordination with the Environmental Services Division and Plant Engineering, is reducing roosting sites, and through the USDA Wildlife Services, is also implementing an active harassment program.

## Rodents

Rodents, such as mice, rats, and squirrels, provide a prey base for a variety of wildlife species, including raptors, coyotes, and fox that are hazards to aircraft. The USAF recommends using rodenticides. Food waste should also be controlled. The Environmental Services Division in coordination with Logistics, Plant Engineering, and the NASA Ames Exchange, has been implementing an integrated pest management plan and controlling food waste disposal.

The AMO, in coordination with the Environmental Services Division, is controlling California ground squirrels at the airfield using firearms, fumigants, rodenticides, cage traps and conibear traps. Carcasses on the airfield are removed as soon as possible to avoid attracting scavengers such as vultures.

The salt marsh harvest mouse (*Reithrodontomys raviventris*), which occurs in the northern part of the Center where pickleweed (*Salicornia spp.*) occurs, is protected as an endangered species under the Federal Endangered Species Act. NASA in the 2002 NADP ROD adopted mitigation measures for these species. Although no salt marsh harvest mice have ever been found on the airfield, fumigating, rodenticide application and discing are not performed within or near known habitat.

### Vegetation

The Airfield slopes from low, often wet ground near the Bay to a grassy upland toward the south (U.S. Highway 101). Portions of the Airfield between the runways were at times covered in asphalt and concrete. In the past, the Navy engaged a farmer to maintain some of the areas outside the taxiways in oat and tomato production. More recently, the AMO has mowed the established non-native grasses periodically during the growing season. Local practice would recommend increasing active harassment during and immediately after mowing, and spot seeding bare patches.

USAF generally recommends maintaining grass height at 7 to 14 inches and limiting operations at sunrise and sunset when insect-eating birds are foraging. (Tall, large bodied birds, such as cranes, and fringillids (e.g., sparrows, finches, grosbeaks, and buntings) may be attracted to grass >14 in.) The USAF notes that such an effort without irrigation may be difficult. Further, grass management may create other hazards. Disturbance may increase the risk of invasive, broad-leafed weeds that may attract grasshoppers and thus also insect-eating birds, such as gulls, that pose a moderate to severe hazard to aviation. Without irrigation, bare patches may occur where seeds collect that have not germinated. These seeds are then exposed as a food source that may attract wildlife hazardous to aircraft.

At Ames, mowing and other vegetation management techniques must avoid impacting the salt marsh harvest mouse (*Reithrodontomys raviventris*), protected under the Endangered Species Act, and the associated pickleweed (*Salicornia spp.*), which occur to the north and northwest of the airfield. Mowing and other vegetation management techniques in burrowing owl nesting habitat preserves must likewise be consistent with the 2002 NADP ROD.

Discing and rolling, chaining or tamping is used to level the airfield and provide a suitable seedbed for revegetation. Tamping or rolling is recommended by the USFWS to reduce ground squirrel intrusion. Compliance with storm water management, archeological resource, plant conservation, and wetland laws, regulations, EO's, and APDs and APRs is required during these activities. Federal and California Clean Air Act requirements for air permits and conformity determinations (with the State Air Quality Implementation Plan) may be also required.

The storm water management system at NASA Ames is regulated by a Regional Water Quality Control Board (RWQCB) permit. The AMO must notify the Environmental Service

Division Storm Water Program Manager in advance of discing. The Environmental Services Division will prepare and submit a Notice of Intent with the requisite per acre fees to the. The RWQCB requires seeding within a specified number of days.

Archeological resources are known to occur at NASA Ames, including the airfield. NASA entered into a Programmatic Agreement with the California State Historic Preservation Office under the National Historic Preservation Act as part of the 2002 NADP ROD. To avoid adversely impacting archeological sites, the AMO must coordinate with the Environmental Services Division Cultural Resources Manager in advance to determine mitigation consistent with the Programmatic Agreement. If artifacts including for example human bones are discovered, the AMO must immediately cease disturbance and notify the Division.

Federally designated seasonal wetlands occur in northern areas of NASA Ames and are regulated by the USEPA and US Army Corps of Engineers under the Federal Clean Water Act, EO 11990, Protection of Wetlands (May 24, 1977, 42 FR 26961), EO 11988, Floodplain Management (May 24, 1977, 42 FR 26951), and NASA regulations at 14 CFR subpart 1216.2. Wetlands are defined in terms of soil and vegetation. NASA, in the 2002 NADP ROD, committed to maintaining these wetlands. Maps and other information can be obtained from the Environmental Services Division.

EO 13112, Invasive Species, and the Federal Noxious Weed Act of 1974 require agencies to avoid introducing or spreading invasive species, such as black mustard (*Brassica spp.*), and especially noxious weeds, such as yellow star thistle, (*Centaurea solstitialis L.*). Black mustard and yellow star thistle are known to occur in disturbed areas at or in the vicinity of NASA Ames. Black mustard is one of the most widespread invasives and yellow star thistle is invasive and noxious. The AMO, in coordination with the Environmental Services Division, Plant Engineering, and the USDA, is testing different seed and mowing regimes to avoid the spread of these invasive species. Native species are encouraged but non-natives that are non-invasive and not noxious may also be maintained.

**Summary**

Risk		Action
General		Request Environmental Services Division obtains USFWS depredation permits.
		Provide MSDS to Environmental Services Division for approval prior to chemical use.
		Follow Health and Safety procedures.
Mammals		
	Deer	Sightings are rare. Continue to monitor.
	Coyote	Sightings are rare. Continue to monitor.
	Mountain lion	Sightings are rare. Continue to monitor.
	Fox (grey and red)	Sightings are rare. Continue to monitor.
	Black-tailed jackrabbit	Implement lethal removal on airfield as necessary.
	Ground squirrels	Continue lethal removal using firearms, fumigants, rodenticides, cage traps and conibear traps.
Large bodied birds		

# WILDLIFE HAZARD MANAGEMENT PLAN

Rev 10/08

	Canada geese	Continue active harassment and lethal removal as necessary.
		Continue to coordinate with NASA Exchange, local golf courses, parks, and airfields.
	Vultures	Remove carcasses on the airfield as they are discovered.
		Continue active harassment and lethal removal as necessary.
	Golden eagle	Continue active harassment under USFWS Eagle Depredation Permit (which does not permit lethal removal).
		Implement lethal removal of squirrels and jackrabbits on the airfield.
	Hawks, large owls (e.g., Barn Owls)	Continue active harassment.
		Manage small mammal populations, including assisting in implementing Center-wide squirrel management plan (in draft), Integrated Pest Management Plan, Feral Cat Management Plan and food waste and solid waste management regulations.
		Trap and relocate as necessary.
		Lethal removal will be considered if the relocated raptor returns to the airfield.
	Cranes	Continue to maintain grass below 14”.
		Continue active harassment and lethal removal as necessary.
	Gulls	Continue to implement active harassment and lethal removal as necessary.
		Implement grasshopper control.
	Ducks and other waterfowl	Continue to coordinate with U.S. Fish and Wildlife Service to manage vegetation and water depth.
		Continue to implement active harassment and lethal removal as necessary.
Flocking birds (not large bodied)		
	Shorebirds	Coordinate with Facilities Engineering and Maintenance to repair drains.
		Continue to coordinate with Environmental Services Division in participating in the development of the South SF Bay Salt Marsh Restoration Plan EIS and Army Corps of Engineers Shoreline Study EIS.
		Continue to implement active harassment and lethal removal as necessary.
	Pigeons	Continue to enforce no feeding requirement.
		Coordinate with Facilities Engineering and Maintenance to further reduce availability of perches.
		Continue to implement active harassment and

# WILDLIFE HAZARD MANAGEMENT PLAN

Rev 10/08

		lethal removal as necessary.
	Doves	Obtain approval from Environmental Services Division to assure application of pesticides, herbicides and other agricultural practices is consistent with 2002 NADP ROD, including the Biological Opinion for threatened and endangered species under the ESA such as the California clapper rail which occupies areas to the north and west of the airfield.
		Implement mowing two to three times per growing season.
		Conduct additional harassment during and immediately following mowing.
		Continue to reduce availability of perches.
		Continue to implement active harassment and if active harassment is ineffective, lethal removal as necessary.
	Grassy passerines	Same as for doves, except avoid lethal take.
	Crows and ravens	Manage trees near airfield.
		Continue to implement food waste and solid waste regulations.
		Continue to implement active harassment and lethal removal as necessary.
	Blackbirds and Starlings	Continue to implement active harassment and lethal removal as necessary.
		Use humane traps to control as necessary.
		Continue to reduce availability of perches.
Burrowing owls		General: Coordinate with Environmental Services Division to assure consistency with 2002 NADP EIS ROD Mitigation Implementation and Management Plan (MIMP).
		Participate in Squirrel Management Team to maintain Squirrel Maintenance Plan and protocols for avoiding take of burrowing owls during implementation of ground squirrel abatement measures, e.g., during baiting, fumigation, etc.
		Remove dead squirrels at least once daily during rodenticide use.
		Coordinate with Environmental Services Division to passively relocate owls from airfield and runway approaches. No relocation during nesting season.
		Install at minimum 3 artificial burrows in owl preserves or in non-airfield owl habitat for every burrow closed.
Vegetation		Conduct surveys for western burrowing owls prior to discing or mowing.
		Obtain approval from Environmental Services Division to assure application of pesticides,

# WILDLIFE HAZARD MANAGEMENT PLAN

Rev 10/08

		herbicides and other agricultural practices is consistent with 2002 NADP ROD, including the Biological Opinion for endangered species under the ESA.
		Check for known archeological sites and during disturbance if artifacts are discovered, cease mowing and discing and notify Cultural Resources Manager in the Environmental Services Division immediately.
		Place weed free bales of straw, waddles or covers around storm drains and protect light fixtures.
		Request Environmental Services Division Storm Water Program Manager to submit Notice of Intent to disturb the soil (e.g., by discing) and associated per acre fees to Regional Water Quality Control Board (RWQCB).
		Coordinate with Environmental Services Division to determine if air permits or conformity analyses will be required.
		Coordinate mowing schedule with the Environmental Management Division and Plant Engineering for integrated approach to mowing the burrowing owl preserves, the Airfield, and the landscaped areas to encourage owl and squirrel location in the preserves. Mow as required during growing season to maintain vegetation height.
		Increase active harassment during and immediately after mowing.
		Avoid use of heavy equipment on wet ground.
		Do not fill federally designated seasonal wetlands.
		Consider using geotechnical fabric.
		Consider using biodiesel in grounds maintenance equipment.

## 2. FAA APPROVAL

FAA approval for this plan is not required. This management plan will become effective upon approval by the Chief, Aviation Management Office (Code JO), the Director of Center Operations (Code J), and the Director of Safety, Environment, and Mission Assurance (Code Q).

## 3. AUTHORITY

The following shall be designated as having responsibilities in bird and wildlife control at Moffett Federal Airfield at NASA Ames:

## **Program Authority**

### **Aviation Management Office**

Program authority for assuring aviation safety and implementing the Wildlife Hazard Management Plan at Moffett Federal Airfield at NASA Ames is the responsibility of Chief, Aviation Management Office, Code JO.

The AMO will consult mission support organizations for their expertise in wildlife and related issues and to assure compliance with Federal, State, and local laws, regulations, and EO's, and NASA and NASA Ames policies and procedural requirements. The AMO in consultation with the Environmental Services Division must then complete any required National Environmental Policy Act (NEPA) documentation.

### **Environmental Services Division**

The Environmental Services Division, in coordination with the AMO and Plant Engineering, will obtain any necessary regulatory approvals and permits and assure compliance, e.g., with the storm water system permit, air permits, hazardous materials and hazardous waste permits, and wildlife permits. (Permits to apply herbicides, rodenticides, fungicides, and other pesticides must be obtained by the applicator and approved by the Environmental Services Division before use.)

In addition, the Environmental Services Division will conduct wildlife, vegetation, soil, and ecological surveys, studies, and investigations, at the airfield and throughout the Center to further the Agency's strategic goal of carrying out its mission in a safe and environmentally sound manner. The Environmental Services Division will provide advice and technical oversight in preparing any necessary NEPA or Endangered Species Act documentation and interagency communication, coordination, and consultation.

The AMO, except where noted otherwise, is responsible for the following actions.

### **Health and Safety Division**

The Health and Safety Division will provide guidance and oversight to assure health and safety. The Division provides certain health and safety training, such as in personal protective equipment, respiratory protection, and hearing conservation, and guidance on other training.

## **Grounds Maintenance**

Turf: The USAF recommends maintaining a dense, uniform grass cover, with grass height between 7 and 14 inches, eliminating broad leaf weeds and seeding bare spots. See section of vegetation.

Drainage: Take additional active bird control efforts during periods when the airfield has standing water especially during and after unusually high rainfall.

Prior to disturbance, e.g., by discing, notify the Environmental Services Division and request the Division submit a Notice of Intent and the associated per acre fees to the RWQCB. Follow all permit terms and conditions. Protect storm drains and

infrastructure such as lighting, using weed free straw bales. Seed within specified time period.

Do not fill federally designated seasonal wetland areas.

**Active Harassment**

Authorize USDA Wildlife Services to implement an active harassment program. Approved AMO personnel will conduct harassment activities in the absence of Wildlife Services personnel. The AMO will have on file a current list of approved personnel.

Request Federal and State permits through the Environmental Services Division, in coordination with the USDA Wildlife Services, as needed, for harassment, e.g., under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act.

Implement active harassment in accordance with the AMO Wildlife Control Safety Plan (Appendix 6) and permit conditions. Coordinate with NASA Dispatch and Air Traffic Control (ATC) to ensure the safety of airfield operations.

Active harassment will be used before using firearms to control migratory birds. All required personal protective equipment will be worn.

**Depredation Control**

Request Federal and State depredation permits through the Environmental Services Division, in coordination with the USDA Wildlife Services, for depredation involving lethal removal of species and non-lethal methods to control migratory birds and other protected species.

All permittees and sub-permittees must maintain a copy of the USFWS depredation permit and be able to readily produce the document when asked by USFWS or CDFG officials.

Maintain depredation permits at the Aviation Management Office. Provide copies to the Environmental Services Division.

Authorize USDA Wildlife Services in coordination with Plant Engineering and the Environmental Services Division to implement depredation control measures. Implement depredation control measures in accordance with the AMO Wildlife Control Safety Plan (Appendix 6) and permit conditions.

All individuals who are involved in bird and wildlife control at the airfield must be identified and designated in writing to the AMO. Airfield personnel will comply with all CDFG and USFWS regulations relevant to the control of wildlife.

**Reporting**

USDA Wildlife Services will document wildlife control efforts daily. USDA Wildlife Services will compile data at the end of each month and distributed to personnel in the AMO, the Environmental Services Division, and the CA ANG. Use these data to determine trends in bird/wildlife activity and assist in development of habitat management priorities.

Report all dead, injured and sick birds and mammals on the airfield to the Environmental Services Division Wildlife Biologist upon discovery. Coordinate all investigations of suspected bird or other wildlife strikes with the Environment Services Division Wildlife Biologist, who will report bird kills to regulatory agencies if required by regulation. If evidence a bird strike is present send the carcass to the Smithsonian Institute for identification (see protocol below), otherwise, transfer the remains to the Environmental Services Division Wildlife Biologist who will obtain forensic analysis and provide the results to the AMO.

#### **4. INSPECTION OF MOVEMENT AREAS**

This section provides for the routine inspection of aircraft movement areas and perimeter fences for evidence of bird and other wildlife activity.

##### **Sweeps of Runways**

Conduct sweeps of runways for birds, other wildlife, and debris at a minimum under the following circumstances:

##### **4.1.1 Early Morning**

1. Conduct runway sweeps for each runway during this period.

##### **4.1.2 Opening a Runway**

1. Conduct a sweep if any runway has been closed or inactive for a lengthy period of time (more than 3 hours).
2. Conduct sweeps following events such as air shows and other vehicular activities using runways for demos, training, etc.

##### **4.1.3 Upon Demand**

1. Conduct a sweep at the request of the tower, air carrier or any other source.

##### **4.1.4 Dead, Sick and Injured Wildlife**

1. Follow NASA and NASA Ames policy and procedures and U.S. Department of Health and Human Services (HHS) Centers for Disease Control and Protection (CDC) "Interim Guidance for States Conducting Avian Mortality Surveillance for West Nile Virus (WNV) and/or Highly Pathogenic H5N1 Avian Influenza Virus" for personal protective equipment for handling dead, sick, and injured wildlife. See: <http://www.cdc.gov/flu/avian/doh/aviansurveillance.htm> . See also U.S. Department of the Interior (DOI) Geological Survey (USGS) National Wildlife Health Center (NWHS) "Wildlife Health Bulletin #05-03" (August 29, 2005): [http://www.nwhc.usgs.gov/publications/wildlife\\_health\\_bulletins/WHB\\_05\\_03.jsp](http://www.nwhc.usgs.gov/publications/wildlife_health_bulletins/WHB_05_03.jsp)
2. Use personal protective equipment for handling wildlife.
3. Remove all dead wildlife upon discovery.
3. Remove all dead wildlife following depredation activities.
4. Report all dead, sick and injured wildlife to USDA Wildlife Services Wildlife Biologist or the Environmental Services Division Wildlife Biologist.

5. Report all wildlife strikes in accordance with the Bird Strike Reports paragraph below and the Reporting paragraph above.

## Bird/Wildlife Hazard Condition (BWHC) Determinations

USDA Wildlife Services will inform ATC of the BWHC. Airfield personnel can determine the BWHC during sweeps of runways. In addition, other airfield users can make determinations as conditions warrant. Report BWHC to ATC and Base Operations. ATC will advise departing and arriving aircraft of the BWHC.

### 4.2.1 Bird/Wildlife Hazard Conditions:

SEVERE: Heavy concentration of birds on or immediately above the active runway or other specific locations that represent an immediate hazard to safe flying operations. Aircrews must thoroughly evaluate mission need before operating in areas under condition SEVERE.

MODERATE: Concentrations of birds observable in locations that represent a probable hazard to safe flying operations. This condition requires increased vigilance by all agencies and extreme caution by aircrews.

LOW: Normal bird activity on and above the airfield with a low probability of hazard. Continue with operations as normal.

WARNING: When the BWHC is MODERATE or SEVERE; it will remain as such until wildlife are no longer a threat to aircraft.

## Bird Strike Reports

Contract with USDA Wildlife Services and require Base Operations personnel on duty to complete bird strike reports for bird remains found within 250 feet of any runway or taxiway. Provide assistance by Operations staff to tenants and other airfield users in reporting strike events in accordance with the AMO's policy. Follow up will be conducted by the Operations staff on duty on any strike reported by a pilot or the tower. Notify the 129<sup>th</sup> CA Air National Guard of all strikes involving, or possibly involving CA ANG aircraft.

### 4.1.5 Report Form

1. Record all bird/wildlife strikes on the Air Force Wildlife Strike Report form (Appendix 2).
2. If known, add location and altitude of the strike and if known what phase of flight the aircraft was in when the strike occurred.
3. Archive completed forms in the AMO and forward to the 129<sup>th</sup> Rescue Wing, California Air National Guard.

### 4.1.6 Species Identification

1. If a dead bird shows evidence of a strike, follow Center for Disease Control protocols for personal protective equipment and transfer all unidentifiable remains from strikes to the CA ANG for shipment to the Smithsonian Institution in Washington D.C. for identification by forensic ornithologists. See Appendix 3 for additional information.

2. If the remains do not show evidence of a bird-aircraft strike, follow Center for Disease Control protocols for personal protective equipment and transfer remains to or contact the Environmental Services Division Wildlife Biologist who will arrange for a forensic analysis and provide results to the AMO and USDA Wildlife Services. The Environmental Services Division will report strikes to the appropriate regulatory agency as required.

## **5. WILDLIFE CONTROL MEASURES**

The AMO is using active harassment, trapping, habitat management and firearms to minimize wildlife hazards on the airfield. Active harassment will include the use of pyrotechnics, bioacoustics, and propane cannons. Contact Base Operations before accessing the airfield for wildlife control. Base Ops will notify Moffett Dispatch, ATC, and the 129<sup>th</sup> that the AMO will be conducting wildlife control on the airfield. No one will shoot firearms or pyrotechnics towards the 129<sup>th</sup> aircraft parking ramp, any hangar, road, or the airfield fence. Firearms and pyrotechnics will not be used in the direction of personnel within 1,000 feet. Clean up all debris (wildlife, shell casings, etc) and dispose of in accordance with FOD, health and safety, and environmental requirements. Contact the Moffett Ground ATC tower on trunking radio at completion of the operation and announce that operation is complete. After exiting the area, contact Base Operations and let them know that your operation is complete.

### **Vegetation**

Vegetation management has been implemented at the airfield by NASA and prior to the transfer to NASA by the Navy to deter hazardous wildlife or prey that would attract hazardous wildlife.

The USAF recommends airfield vegetation to be maintained at a height of 7 to 14 inches in a thick, uniform stand of sod-forming vegetation that will fill bare spots and out-compete weeds, thus discouraging many flocking species, limiting the ability of birds to locate invertebrate food sources and detect predators, and increasing the difficulty of movement. The USAF acknowledges that in the Southwest achieving this type of cover will be difficult without irrigation.

Use a series of mowing, discing and herbicide application to achieve the desired vegetation cover. Coordinate with the Environmental Services Division and Plant Engineering in developing techniques through experimentation and follow up surveys that will identify the best species of grasses and schedule of mowing to provide the recommended uniform vegetation cover. One possible experiment involves allowing the grass to go to seed once prior to mowing (coupled with increased active harassment) to encourage a more uniform cover; however, where star thistle is present, mow before thistle forms a seed head.

Except in the owl preserve, avoid mowing the vegetation shorter than 6 or 7 inches, or allowing it to reach heights where it becomes uneven to prevent growth of broad-leaved weedy vegetation that provides food and cover for wildlife and increases bird hazards at the airfield.

**Pyrotechnics**

Pyrotechnics launched from a pyrotechnic launcher or shotgun will be the most commonly used control devices on the facility. Use a combination of screamers, bangers and shellcrackers to be most effective. Use care to not over use a device or become complacent about safety. Wear safety glasses and hearing protection when using this method.

Fire the pyrotechnic launcher with arms fully extended away from the body. If the pyrotechnics fail to fire, hold the barrel down range away from other people and equipment for 30 seconds before attempting to remove the pyrotechnic round.

Store unused pyrotechnics in a secure, cool dry place and rotate stock frequently.

Coordinate with the NASA Ames Health and Safety Division Explosives Safety Officer, Protective Services, and Fire Department.

Do not shoot pyrotechnics towards the 129<sup>th</sup> CA ANG aircraft parking ramp, any hangar, road, or the airfield fence. Do not use pyrotechnics in the direction of personnel within 1,000 feet.

Clean up all debris (e.g., wildlife, shell casings, etc) and dispose of in accordance with FOD, health and safety, and environmental requirements.

Contact the Moffett Ground ATC tower on trunking radio at completion of the operation and announce that operation is complete.

After exiting the area, contact Base Operations and let them know that your operation is complete.

**5.1.1 Pyrotechnics Safety (also see AMO Wildlife Control Safety Plan-Appendix 6)**

1. Always use ear and eye protection.
2. Do not shoot at the ground.
3. Be aware of dry grass and brush.
4. Have a fire extinguisher nearby.
5. Use firearm safety at all times.
6. Use only devices designed for the pyrotechnic device.

**5.1.2 Operation**

1. Contact the Moffett Ground ATC tower on trunking radio before using shotguns or launching any pyrotechnics. The tower will let you know if there is airborne or ground traffic.
2. Move as close to bird/flock as possible.

3. Load pistol once you are as close as possible by first loading the primer, then the screamer or banger (pyrotechnic round) taking care to put the fuse end toward the barrel.
4. Point the pistol over the bird/flock at a 45 degree angle, with arm fully extended and fire.
5. If bird/flock move to land nearby, immediately approach the flock and repeat the procedure.
6. Use combinations of screamers and bangers.

#### 5.1.3 Potential Problems

1. Habituation - if used too often, birds will get used to the noise.
2. Fire hazards - if rounds explode near the ground during dry conditions.
3. Hazardous materials or hazardous waste disposal violations.
4. Health and safety violations.

### **Bioacoustics**

Bioacoustics are currently not in use at Moffett Federal Airfield at NASA Ames. However, bioacoustics are a valuable tool that may be utilized in the future as conditions warrant.

#### 5.1.4 Operation

1. Identify species of bird to be dispersed.
2. Select the appropriate distress call tape for the particular species and load into the cassette deck.
3. Drive vehicle as close to the bird flock as possible.
4. Play the distress call for 10 to 15 seconds.
5. If birds respond with mobbing behavior (coming towards the speaker), disperse with pyrotechnics. Repeat distress call.
6. Do not continue to play the tape for more than 15 seconds and not more frequently than 3 times in one hour.

#### 5.1.5 Potential Problems

1. Habituation - if used too often, birds will get used to the noise.
2. Mobbing - birds may attack the speakers.

### **Propane Cannons**

Propane cannons are mechanical devices that produce loud report that are louder than a shotgun blast. Propane cannons have been very effective in deterring a variety of bird species, but are most effective on waterfowl, gulls, and blackbirds.

#### 5.1.6 Operation

1. Set up in appropriate area.

2. Use remote transmitters or a timer to fire cannons.
  3. Move the cannons to any area as needed. Appropriate locations include the north end of the airfield during waterfowl migration and locations where birds congregate regularly.
  4. Do not operate the cannon continuously.
  5. Use in combination with other control methods.
- 5.1.7 Safety (Also see AMO Wildlife Control Safety Plan-Appendix 6)
1. Always wear ear and eye protection.
- 5.1.8 Potential Problems
1. Habituation - if cannon stays in one place too long or fires on a schedule, birds will habituate.
  2. Fire hazards - do not set up in dry grassy areas or the cannons must be mounted 3 to 4 feet above any vegetation.

### **Traps**

Implement humane trapping of wildlife as needed for target species.

- 5.1.9 Operation
1. Use traps that are specifically designed for the species of wildlife that is targeted.
  2. Check mammal traps daily and immediately remove any trapped wildlife. Follow regulations for disposal of carcasses.
  3. If traps are not checked on a daily basis, provide water and food.

### **Food Source Elimination**

Food source management is a critical element of controlling for hazardous wildlife at the airfield and can reduce the need to use other tools that may be controversial or present health and safety or environmental risks.

1. When there is an influx of wildlife on the airfield; identify and minimize or eliminate their food source.
2. Install wildlife resistant dumpsters as necessary.
3. Keep dumpster lids closed.
4. Encourage use of proper food waste disposal measures.
5. Develop or update an integrated pest management plan in coordination with the Environmental Services Division and Plant Engineering before applying pesticides.
6. Obtain approval for use of pesticides, fungicides, rodenticides and herbicides from the Environmental Services Division.
7. Assure that applicators have necessary permits, training, and protective gear.
8. Follow vegetation management protocols.
9. Store hazardous materials and waste following NASA Ames procedural requirements. Inventory in Hazardous Materials Inventory System.

10. Complete Form A (Environmental Services Division) to request pick up and disposal of hazardous waste.
11. Cooperate with Environmental Services Division in prohibiting artificial feeding.

**Rodenticides**

The AMO uses rodenticides as one of several tools to control rodents at the airfield and adjacent CA ANG facility. The primary purpose of this control action is to reduce the population of ground squirrels so as to:

- 1 Limit the attractiveness of the airfield as foraging habitat for raptors and other wildlife that prey on ground squirrels.
- 2 Limit the damage caused by squirrels that undermine structural foundations and ammunition depot mounds.
- 3 Reduce the number of squirrel burrows on the airfield to decrease the damage incurred to aircraft should an aircraft leave the runway during an emergency.
- 4 Keep the squirrel numbers down to a manageable level.

To apply rodenticides:

1. Obtain requisite training and maintain training records. Wear required personal protective equipment.
2. Use only after burrowing owl survey by Environmental Services Division Wildlife Biologist.
3. Use zinc phosphide or chlorophacinone treated grain between the taxiways and runways and to a lesser area, approximately 300 acres, leased by the California National Guard.
4. Obtain approval of the AMO and the Environmental Services Division to use other rodenticides.
5. Do not apply within 250 feet of any known burrowing owl locations. Coordinate with Environmental Services Division Wildlife Biologist to conduct banding, surveys, burrow mitigation, and passive relocation prior to use of rodenticides.
4. Do not place rodenticides within 100 yards of salt marsh harvest mouse (*Reithrodontomys raviventris*) habitat. This habitat is identified by the presence of pickleweed (*Salicornia spp.*).
7. Do not apply rodenticide without supervision by a California Certified Pesticide Applicator with prior permission from the Santa Clara Department of Agriculture, when required.
8. Follow NASA Ames hazardous materials and hazardous waste disposal procedures.

**Fumigants**

To control ground squirrels, the AMO uses fumigants, typically gas cartridges that produce carbon monoxide gas when ignited, filling ground squirrel burrow systems. These can only be used when a ground squirrel is seen to enter a hole and no evidence of burrowing owls occurring in the near vicinity. They will not be used in salt marsh harvest mouse habitat.

**5.1.10 Operation**

1. Observe squirrel enter hole and survey area for evidence of burrowing owls.
2. Puncture holes in one end of gas cartridge and insert fuse.
3. Light and insert cartridge in burrow.
4. Fill burrow with dirt and watch for seeping gas.
5. Fill any other holes or cracks where gas is escaping.

**5.1.11 Potential Problems**

1. Fire hazards - Do not use near dry grass or in burrows near buildings due to fire hazard and potential to inject smoke into buildings.

**Firearms**

Lethal control using firearms may be necessary to reduce the long-term and persistent hazards posed by such birds as rock doves, gulls, European starlings, blackbirds, Canada geese, and other bird and wildlife species.

1. Use firearms only when wildlife is not responsive to harassment techniques, to reinforce harassment techniques and when a severe hazard exists.
2. All personnel will have appropriate training and appropriate personal protective equipment (eye protection, hearing protection, etc).
3. A depredation permit from the USFWS will be on file in the AMO and the Environmental Services Division for migratory birds and in possession while exercising its authority.
4. Contact the Moffett Ground ATC tower on trunking radio before using firearms to control birds. The tower will advise if there is airborne or ground traffic.

**Other Wildlife Control Methods**

Other wildlife control methods may be useful in specific situations and upon availability.

1. Use trained falcons, trained dogs, remote controlled planes and other wildlife control methods only if approved by the Aviation Management Office.

**6. COMMUNICATIONS**

Assure careful coordination and communication with ATC personnel to avoid moving birds and wildlife into the path of aircraft.

**Harassment Operations**

1. Prior to dispersal activity, ATC personnel, Protective Services and 129<sup>th</sup> Security must be advised of planned activity.

**ATC**

2. Air Traffic Control personnel must advise all air traffic when birds or wildlife are observed in the immediate path of aircraft. Additionally, Air Traffic Control personnel

must communicate bird/wildlife activities reported by aircraft and grounds personnel to all aircraft operating in the area.

**ATIS**

3. Indicate significant bird/wildlife activity that presents temporary hazards on ATIS.

**NOTAM**

4. Communicate persistent bird and wildlife hazards through NOTAMs.

**7. REVIEW OF THE WILDLIFE MANAGEMENT PROGRAM**

Conduct an annual review of the Wildlife Hazard Management Program or immediately following any of the following events:

1. A multiple bird strike.
2. A strike involving engine ingestion.
3. A strike with wildlife other than birds.
4. At the request of any tenant or other flying organization.
5. Bird control staff report a significant increase in bird/wildlife activity around the airfield.

**Aviation Safety Committee**

The Aviation Safety Committee will conduct the review of the Wildlife Hazard Management Program. The following as a minimum will be reviewed:

1. Review of USDA's monthly reports and strike reports.
2. Assessment of on airfield wildlife habitat.
3. A review of wildlife hazards to aviation.
4. Review wildlife habitat management priorities and target date.
5. Assessment of new construction or habitat changes.
6. Assessment of off-airfield wildlife habitat/land uses.
7. Identify any new off-site attractions (landfills, parks, agriculture, wetlands, etc).
8. Review personnel and equipment requirements.
9. A review of AMO bird control techniques and methods.
10. Permit requirements.
11. Safety.
12. Review of the current Wildlife Hazard Management Plan.

**Summary Report**

Following the program review, the Aviation Safety Committee must prepare a summary report and the Chair of the Committee must file the report in the AMO, with a copy to the Environmental Services Division.

**Bird Hazard Working Group (BHWG)**

Hold BHWG meetings twice a year to meet CA ANG requirements.



Appendix 2

Air Force Wildlife Strike Report

AIR FORCE WILDLIFE STRIKE REPORT		
<b>1. UNIT-WING/SQUADRON</b>	<b>11. EFFECT ON FLIGHT</b> <input type="radio"/> UNKNOWN <input type="radio"/> ABORTED TAKE-OFF <input type="radio"/> ENGINES SHUTDOWN <input type="radio"/> NONE <input type="radio"/> OTHER <input type="radio"/> PRECAUTIONARY LANDING	<b>20. PILOT WARNING</b> <input type="radio"/> SAW BIRD BEFORE IMPACT <input type="radio"/> BIRDS REPORTED TO PILOT <input type="radio"/> (A) AND (B) <input type="radio"/> NONE OF THE ABOVE
<b>2. AIRCRAFT</b> (alphanumeric designation)	<b>12. SPEED</b> (Kias)	<b>21. BIRD AVOIDANCE MODEL</b> <input type="radio"/> UNKNOWN <input type="radio"/> NO REPORT <input type="radio"/> LOW <input type="radio"/> MODERATE <input type="radio"/> SEVERE
<b>3. TAIL NUMBER/REGISTRATION</b>	<b>13. ALTITUDE</b> (ft AGL)	
<b>4. DATE</b> (dd mmm yyyy)	<b>14. LANDING LIGHTS</b> <input type="radio"/> YES (on) <input type="radio"/> UNKNOWN <input type="radio"/> NO (off) <input type="radio"/> NOT APPLICABLE	<b>22. BIRD WATCH CONDITION</b> <input type="radio"/> UNKNOWN <input type="radio"/> NO REPORT <input type="radio"/> LOW <input type="radio"/> MODERATE <input type="radio"/> SEVERE
<b>5. TIME</b> (local hh:mm)	<b>15. STROBE LIGHTS</b> <input type="radio"/> YES (on) <input type="radio"/> UNKNOWN <input type="radio"/> NO (off) <input type="radio"/> NOT APPLICABLE	
<b>6. DAILY PERIOD</b> <input type="radio"/> UNKNOWN <input type="radio"/> DAWN <input type="radio"/> DAY <input type="radio"/> DUSK <input type="radio"/> NIGHT	<b>16. PHASE OF FLIGHT</b> <input type="radio"/> UNKNOWN <input type="radio"/> PARKED <input type="radio"/> TAXIING <input type="radio"/> TAKEOFF ROLL <input type="radio"/> TAKEOFF INITIAL CLIMB <input type="radio"/> CRUISE CLIMB <input type="radio"/> CRUISE <input type="radio"/> CRUISE LOW LEVEL <input type="radio"/> RANGE OPS <input type="radio"/> CRUISE DESCENT <input type="radio"/> HOVER <input type="radio"/> LANDING FINAL APPROACH <input type="radio"/> LANDING TRAFFIC PATTERN <input type="radio"/> LANDING FLARE/ROLLOUT <input type="radio"/> MISSED APPROACH/ TOUCH & GO	<b>23. WILDLIFE SEEN</b> <input type="radio"/> UNKNOWN <input type="radio"/> NONE <input type="radio"/> ONE <input type="radio"/> 2-10 <input type="radio"/> 11-100 <input type="radio"/> MORE THAN 100
<b>7.b. SPECIAL USE AIRSPACE</b> <input type="radio"/> ALERT <input type="radio"/> DANGER <input type="radio"/> MILITARY OPERATIONS AREA <input type="radio"/> PROHIBITED <input type="radio"/> RESTRICTED <input type="radio"/> TEMPORARY RESERVED <input type="radio"/> AIRSPACE <input type="radio"/> WARNING NAME:	<b>25. WILDLIFE SIZE</b> <input type="radio"/> UNKNOWN <input type="radio"/> SMALL (sparrow size) <input type="radio"/> MEDIUM (pigeon size) <input type="radio"/> LARGE (duck size)	
<b>7.c. LOW-LEVEL ROUTE</b> INSTRUMENT ROUTE IR _____ SLOW ROUTE SR _____ VISUAL ROUTE VR _____ OTHER:		<b>17. FLIGHT PATH</b> (relation to clouds) <input type="radio"/> UNKNOWN <input type="radio"/> ABOVE CLOUDS <input type="radio"/> BELOW CLOUDS <input type="radio"/> BETWEEN LAYERS <input type="radio"/> CLEAR <input type="radio"/> IN CLOUDS
<b>8. AWARENESS OF STRIKE IN FLIGHT</b> <input type="radio"/> YES (time and location known) <input type="radio"/> NO <input type="radio"/> UNKNOWN	<b>18. CLOUD TYPE</b> <input type="radio"/> UNKNOWN <input type="radio"/> BROKEN <input type="radio"/> CLEAR <input type="radio"/> OVERCAST	
<b>9. LATITUDE</b> N- Degree Minutes: Second S	<b>19. PRECIPITATION</b> <input type="radio"/> UNKNOWN <input type="radio"/> FOG <input type="radio"/> RAIN <input type="radio"/> SNOW <input type="radio"/> NONE	<b>27. BIRD STRIKE REPORTED BY</b> (name, rank, DSN phone, E-mail)
<b>10. LONGITUDE</b> E- Degree Minutes: Second W		

AF FORM 853, 20010501 (EF-V1)

PREVIOUS EDITION IS OBSOLETE.

# WILDLIFE HAZARD MANAGEMENT PLAN

Rev 10/08

<b>AIR FORCE WILDLIFE STRIKE REPORT</b>																																																																																														
<p><b>28. COST ESTIMATE</b>  <input type="radio"/> NOT APPLICABLE  <input type="radio"/> ESTIMATED COST (not yet known)  <input type="radio"/> ACTUAL COST                      \$ _____</p>	<p><b>32. REMAINS FOUND ON RUNWAY</b>  <input type="radio"/> NO  <input type="radio"/> YES, REMAINS FOUND ON RUNWAY (aircraft struck unknown)  <input type="radio"/> YES, REMAINS FOUND ON RUNWAY (aircraft struck known)</p>	<p><b>WILDLIFE REMAINS</b>                      IAW AFI 91-204, 7.4.7, feather remains from <b>every</b> bird strike, if available, must be sent to the Smithsonian National Museum of Natural History for identification. Send feathers or feather fragments and a copy of the corresponding BASH SAS report to:                       Smithsonian Institution                      Natural History Building                      Division of Birds                      ATTN: Dr. Carla Dove                      NHBE 610 MRC 116                      10<sup>th</sup> and Constitution Ave. NW                      Washington, DC 20560</p> <p>Send as much material as possible to include feet, beak, wing, tail, breast, and back feathers. For wildlife strikes other than birds, send samples of skin, fur, teeth, other non-fleshy remains, or a picture if possible, along with the corresponding BASH SAS report to the Smithsonian for identification.</p> <p>In the event that remains are found on the runway as the result of a suspected strike, they should also be sent to the Smithsonian.</p> <p>For overnight shipping of specimen, wrapping the remains in newspaper and freezing it entirely should be adequate. If you collect a whole bird carcass, freeze it per the above instructions and contact the Smithsonian at (202) 357-2334 to see if they could use the specimen in their collection.</p> <p>Please forward copies of any photographs of the strike to the BASH Team via E-mail or regular mail:                       HQ AFSC/SEFW                      9700 G Ave Se, Bldg 24499                      Kirtland AFB, NM 87117-5671</p> <p>These resources are extremely helpful in educating about mishap prevention and the hazard that wildlife poses to flight.</p>																																																																																												
<p><b>29. CLASS</b>  <input type="radio"/> CLASS A      <input type="radio"/> CLASS C  <input type="radio"/> CLASS B      <input type="radio"/> LESS THAN C</p>	<p><b>33. REMAINS FOUND ON AIRCRAFT</b>  <input type="radio"/> YES  <input type="radio"/> NO  <input type="radio"/> UNKNOWN</p>																																																																																													
<p><b>30. TIME OUT OF SERVICE</b> (days)</p>	<p><b>34. DATE REMAINS SENT TO SMITHSONIAN INSTITUTION</b>                      (dd mmm yyyy)</p>																																																																																													
<p><b>31. IMPACT POINTS</b>                      (description of impact points, and struck or damaged; if the list is not representative of the strike, please explain in the remarks section)</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 5%; text-align: center;">S</th> <th style="width: 15%; text-align: center;">D</th> </tr> </thead> <tbody> <tr><td>UNKNOWN</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>INSIDE ENGINE 1</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>INSIDE ENGINE 2</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>INSIDE ENGINE 3</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>INSIDE ENGINE 4</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>INSIDE ENGINE 5</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>INSIDE ENGINE 6</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>INSIDE ENGINE 7</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>INSIDE ENGINE 8</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>OUTSIDE ENGINE 1</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>OUTSIDE ENGINE 2</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>OUTSIDE ENGINE 3</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>OUTSIDE ENGINE 4</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>OUTSIDE ENGINE 5</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>OUTSIDE ENGINE 6</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>OUTSIDE ENGINE 7</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>OUTSIDE ENGINE 8</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>FUSELAGE/ANTENNA/SKIN</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>RADOME/NOSE</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>WINDSHIELD/CANOPY</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>WINDSHIELD PENETRATION</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>TAIL/STABILIZER/RUDDER</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>WEAPONS/MISSILE POD</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>LANDING GEAR</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>LIGHTS</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>WING/ROTOR</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>FUEL TANKS</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>PROPELLER</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>ECM PODS/PYLONS</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> <tr><td>OTHER (specify in remarks)</td><td style="text-align: center;"><input type="checkbox"/></td><td style="text-align: center;"><input type="checkbox"/></td></tr> </tbody> </table>		S	D	UNKNOWN	<input type="checkbox"/>	<input type="checkbox"/>	INSIDE ENGINE 1	<input type="checkbox"/>	<input type="checkbox"/>	INSIDE ENGINE 2	<input type="checkbox"/>	<input type="checkbox"/>	INSIDE ENGINE 3	<input type="checkbox"/>	<input type="checkbox"/>	INSIDE ENGINE 4	<input type="checkbox"/>	<input type="checkbox"/>	INSIDE ENGINE 5	<input type="checkbox"/>	<input type="checkbox"/>	INSIDE ENGINE 6	<input type="checkbox"/>	<input type="checkbox"/>	INSIDE ENGINE 7	<input type="checkbox"/>	<input type="checkbox"/>	INSIDE ENGINE 8	<input type="checkbox"/>	<input type="checkbox"/>	OUTSIDE ENGINE 1	<input type="checkbox"/>	<input type="checkbox"/>	OUTSIDE ENGINE 2	<input type="checkbox"/>	<input type="checkbox"/>	OUTSIDE ENGINE 3	<input type="checkbox"/>	<input type="checkbox"/>	OUTSIDE ENGINE 4	<input type="checkbox"/>	<input type="checkbox"/>	OUTSIDE ENGINE 5	<input type="checkbox"/>	<input type="checkbox"/>	OUTSIDE ENGINE 6	<input type="checkbox"/>	<input type="checkbox"/>	OUTSIDE ENGINE 7	<input type="checkbox"/>	<input type="checkbox"/>	OUTSIDE ENGINE 8	<input type="checkbox"/>	<input type="checkbox"/>	FUSELAGE/ANTENNA/SKIN	<input type="checkbox"/>	<input type="checkbox"/>	RADOME/NOSE	<input type="checkbox"/>	<input type="checkbox"/>	WINDSHIELD/CANOPY	<input type="checkbox"/>	<input type="checkbox"/>	WINDSHIELD PENETRATION	<input type="checkbox"/>	<input type="checkbox"/>	TAIL/STABILIZER/RUDDER	<input type="checkbox"/>	<input type="checkbox"/>	WEAPONS/MISSILE POD	<input type="checkbox"/>	<input type="checkbox"/>	LANDING GEAR	<input type="checkbox"/>	<input type="checkbox"/>	LIGHTS	<input type="checkbox"/>	<input type="checkbox"/>	WING/ROTOR	<input type="checkbox"/>	<input type="checkbox"/>	FUEL TANKS	<input type="checkbox"/>	<input type="checkbox"/>	PROPELLER	<input type="checkbox"/>	<input type="checkbox"/>	ECM PODS/PYLONS	<input type="checkbox"/>	<input type="checkbox"/>	OTHER (specify in remarks)	<input type="checkbox"/>	<input type="checkbox"/>	<p><b>35. ADDITIONAL REMARKS</b></p>
	S	D																																																																																												
UNKNOWN	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
INSIDE ENGINE 1	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
INSIDE ENGINE 2	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
INSIDE ENGINE 3	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
INSIDE ENGINE 4	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
INSIDE ENGINE 5	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
INSIDE ENGINE 6	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
INSIDE ENGINE 7	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
INSIDE ENGINE 8	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
OUTSIDE ENGINE 1	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
OUTSIDE ENGINE 2	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
OUTSIDE ENGINE 3	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
OUTSIDE ENGINE 4	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
OUTSIDE ENGINE 5	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
OUTSIDE ENGINE 6	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
OUTSIDE ENGINE 7	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
OUTSIDE ENGINE 8	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
FUSELAGE/ANTENNA/SKIN	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
RADOME/NOSE	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
WINDSHIELD/CANOPY	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
WINDSHIELD PENETRATION	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
TAIL/STABILIZER/RUDDER	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
WEAPONS/MISSILE POD	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
LANDING GEAR	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
LIGHTS	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
WING/ROTOR	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
FUEL TANKS	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
PROPELLER	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
ECM PODS/PYLONS	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												
OTHER (specify in remarks)	<input type="checkbox"/>	<input type="checkbox"/>																																																																																												

AF FORM 853, 20010501 (EF-V1)(Reverse)

**Appendix 3**

**FEATHER IDENTIFICATION LAB - General Information**

~~~~

**SHIPPING**

|                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>U.S. Postal Service</b><br/>(routine / non-damaging cases)</p> <p>~~~</p> <p>Feather Identification Lab<br/>Smithsonian Institution<br/>NHB, E600, MRC 116<br/>P.O. Box 37012<br/>Washington, DC 20013-7012</p> | <p><b>Overnight Shipping</b><br/>(priority / damaging cases)</p> <p>~~~</p> <p>Feather Identification Lab<br/>Smithsonian Institution<br/>NHB, E600, MRC 116<br/>10<sup>th</sup> &amp; Constitution Ave., NW<br/>Washington, DC 20560-0116</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

- Include report number or copy of report (AFSAS for military, 5200-7 for civil)
  - Include contact information if not on report

**Feather Lab contact information: 202-633-0801**  
**dovec@si.edu or heackerm@si.edu**

**COLLECTING REMAINS**

Follow Center for Disease Control protocols for using personal protective equipment when handling dead wildlife.

**Whole Feather**

- Whole bird: Pluck a variety of feathers (breast, back, wing, tail)
- Partial bird: Collect a variety of feathers with obvious color or pattern
- Feathers only: Send all material found
- Do not cut feathers from bird (we need the down at the base); Do not use any Sticky substance (ex. tape)
- Place remains in reclosable bag; If remains are fleshy/moist can fold material in paper (ex. paper towel, coffee filter) and use more than one reclosable bag.

**Small Amount of Material**

- Wipe area with paper towel; Send all material / entire towel in reclosable bag
- If needed, spray area with alcohol or water to loosen material for collection

**WEBSITES**  
Air Force: <http://safety.kirtland.af.mil>  
Civil Aviation: <http://wildlife-mitigation.tc.faa.gov>  
Birdstrike Committee: [www.birdstrike.org](http://www.birdstrike.org)

\* Basic safety measures and good hygiene when collecting material is encouraged. Use latex gloves, face mask and eye protection; always thoroughly wash hands after handling remains.

## Appendix 4

### Timeline of Activities at Moffett Federal Airfield at NASA Ames

|                                         |                                                                                                                                               |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| January 2007                            | Disc and revegetate infield areas south of taxiway Alpha and north of taxiway Alpha Alpha.                                                    |
| April/May 2007                          | Install anti-perching bird spikes to runway feet remaining markers.                                                                           |
| January 2008                            | Disc and revegetate infield areas north of taxiway Bravo and south of taxiway Delta (with the exception of the infield with the PAPI lights). |
| Annually                                | Continue discing and revegetating airfield as funding and airfield activities allow.                                                          |
| December/January<br>Annually            | Winter burrowing owl surveys.                                                                                                                 |
| April 15 – July 15<br>Annually          | Nesting season burrowing owl surveys.                                                                                                         |
| May - September<br>Annually             | Use zinc phosphide rodenticide to control California ground squirrel.                                                                         |
| September 1 –<br>January 31<br>Annually | Conduct Burrowing owl passive relocation during this time.                                                                                    |
| Continuously                            | Lethal control of California ground squirrel using firearms, cage traps, conibear traps, fumigants and others.                                |

## Appendix 5

### Deviations from the CA ANG BASH Plan

There are recommendations in the California Air National Guard BASH Plan (November 2006) that deviate from the procedures NASA currently practices. One such recommendation is regarding the management of burrowing owls and their habitat. Another recommendation concerns wetland vegetation and the salt marsh harvest mouse. This appendix addresses these issues and explains the differences.

#### **Burrowing Owls**

Burrowing owls occur on NASA Ames Moffett Federal Airfield and are a California Species of Special Concern. Species of Special Concern status applies to animals not listed under the Federal Endangered Species Act or the California Endangered Species Act, but which nonetheless are (1) declining at a rate that could result in listing, or (2) historically occurring in low numbers with known threats to their persistence. California Department of Fish and Game devised the 'species of special concern' status in order to give some official recognition to species that are vulnerable or have low populations but which have not been listed under the ESA. The USFWS Sacramento Office has identified the western burrowing owl as a Federal Species of Concern (formerly a List 2 Candidate Species under the Federal ESA). Designation of a species as a Federal Species of Concern does not necessarily mean that the species will be listed as threatened or endangered under the Federal ESA. The burrowing owl is protected under the Migratory Bird Treaty Act and several agencies concerned with bird conservation and aviation safety, including the USDA, USFWS, DOD, USAF, and FAA have signed agreements to cooperate in furthering Federal goals for conservation in the context of assuring aviation safety.

NASA has established Burrowing Owl Nesting Habitat Preserves as required by the NASA EIS (July 2002), one of which is on the airfield. In these areas owls are not relocated and ground squirrels are not controlled. The CA ANG BASH plan recognizes the EIS, but it is their position, "that the pursuit of any such habitat within the aircraft movement areas of the AOA runs contrary to aviation and public safety." The current Burrowing Owl Nesting Habitat Preserve on the airfield represents a low strike risk to aircraft for a number of reasons. It is located on the side of the airfield, not on the approach or the departure ends and not in the aircraft movement area. Also, burrowing owls are not a flocking species and typically fly at low altitudes. Burrowing owls are also small in mass and present a low hazard for aircraft damage. Further, the AMO is removing perches or adding raptor deterrents to perches and implementing active harassment to reduce the risk posed by larger bodied birds, such as kestrels, hawks, and larger owls that may be attracted to small rodents, small birds, and insects.

#### **Wetland vegetation and salt marsh harvest mouse**

Section 9 of the Federal ESA of 1973, as amended, prohibits the take or harm of any species listed as threatened or endangered. Harm is defined by the ESA as, "any act that kills or injures the species, including significant habitat modification." The endangered salt marsh harvest mouse is known to exist at NASA Ames. This species is entirely dependent upon salt marshes and associated vegetation. The BASH plan recommends "wetland vegetation should be routinely removed from all area within the Airport Operating Area and flow of drainage maintained to prevent standing water and recurrence of aquatic vegetation." NASA would be in

violation of the ESA if endangered species habitat was destroyed at the airfield. Currently, designated wetlands constitute a very small portion of the airfield at the north end. The existence of these wetland areas does not significantly increase bird activity; therefore no redesignation of wetlands is being actively pursued. NASA has coordinated with other Federal, State, and local agencies to halt activities contributing to subsidence and is taking steps to improve storm water management on the Eastside of NASA Ames.

**Appendix 6**

**Wildlife Control Safety Plan**

August 30, 2005  
Revised 3/08

**Airfield Wildlife Control Safety Plan**

In accordance with Ames Procedural Requirement (APR) 1700.1, Ames Health and Safety Manual, Chapter 12 Explosive Safety, all requirements and procedures to safely handle and use ammunition and pyrotechnic devices applies. The NASA Ames Explosive Safety Officer (ESO) shall review, audit, and approve the hazardous operations involved with use of firearms and pyrotechnic devices. This includes training, certification, procuring, transporting, shipping, receiving, storing, using, disposing and other management of these materials. Code JO and USDA Wildlife Services will conduct wildlife management in accordance with the Wildlife Hazard Management Plan. Wildlife depredation control and harassment will be implemented in accordance with this safety plan.

Safety, health, and environmental training required:

Consult with the Safety and Health Division and the Environmental Services Division.

Maintain training records.

(NOTE: The Environmental Services Division is expanding its wildlife awareness resources, including a brief course and flyers, to avoid violation of permits and regulations at NASA Ames by visitors, contractors, tenants, and others using the Center.)

Location of the airfield requested area to be utilized:

All of the active airfield

List special equipment required:

Personal Protection Equipment (PPE) (i.e., safety glasses, gloves, hearing protection mask).

Hazardous Operation or Chemicals Involved:

Use of 12 gauge shotguns, various pyrotechnic devices, and other wildlife harassment equipment. The Bird Abatement Protocol document further explains the use of pyrotechnics. Pesticides and fumigants are also used.

List and purpose of personnel to participate:

Code JO and USDA Wildlife Services personnel

1. Contact Base Operations before accessing the airfield for wildlife control at 650-603-9213/14. Base Ops will notify Moffett Dispatch, ATC, and the 129<sup>th</sup> that the Aviation Management Office (AMO) will be conducting wildlife control on the airfield.
2. All personnel will have appropriate personal protective equipment for the activity being conducted as required by protocol and the material data safety sheet (eye protection, hearing protection, etc.).
3. All personnel will be trained and certified prior to using firearms, pyrotechnic devices, discing and mowing machinery, pesticides, herbicides, or fumigants that they are operating or applying. Pesticide application will be conducted by a Qualified Applicator as designated by the California Department of Pesticide Regulation to efficiently apply the pesticides in a safe manner while preventing personnel over exposure.
4. A depredation permit from the US Fish and Wildlife Service will be on file in the AMO for migratory birds and in possession while exercising its authority and on file with the Environmental Services Division.
5. MSDS for all hazardous material will be on file in the AMO and the Environmental Services Division. If there are multiple personnel involved in the wildlife control operation there will be a safety briefing prior to the operation.
6. Types and quantities of chemicals stored or used are reported to the Environmental Services Division to assure necessary permits are in place and followed, and reports to regulatory agencies are complete.
7. If there are multiple personnel involved in the wildlife control operation there will be a safety briefing prior to the operation.
8. Stay clear of all runways and taxiways unless you have permission for access from the ATC tower.
9. Maintain communication with and monitor Moffett Ground ATC by trunking radio at all times.
10. Contact the Moffett Ground ATC on trunking radio before using shotguns or launching any pyrotechnics. The tower will let you know if there is airborne or ground traffic.
11. If ATC advises of airborne or ground traffic in the vicinity of wildlife control operations advise ATC that you are in cease fire mode and wait for ATC to inform you the traffic is clear.
12. No one will shoot shotguns or pyrotechnics towards the 129<sup>th</sup> aircraft parking ramp, any hangar, road, or the airfield fence closer than 2,000 feet.
13. Firearms and pyrotechnics will not be used in the direction of personnel within 1,000 feet.
14. Clean up all debris (wildlife, chemicals, cleaning materials, shell casings, etc.) and dispose of in accordance with FOD, health and safety, and environmental requirements.
15. All unused or unexploded ammunition or pyrotechnics devices will be removed and properly disposed of consistent with NASA Ames procedural requirements. Contact the ESO to arrange for removal, transportation and proper disposal.

16. Contact the Moffett Ground ATC on trunking radio at completion of the operation and announce that operation is complete.
17. After exiting the area, contact Base Operations and let them know that your operation is complete.

#### Propane Cannon Operating Procedures

There are four propane cannons available for use at the airfield. They are controlled by remote control. One remote control will be kept in ATC Tower and the other will be kept in Base Operations.

1. All personnel within 20 feet must wear hearing protection.
2. Never stand in front of the cannon unless the cannon is turned off.
3. The cannons are to be used to augment shotguns and other pyrotechnic devices.
4. Check for personnel near cannon before firing cannon.
5. Only fire the cannons when there is wildlife near by or testing as needed.
6. ATC will be notified when the cannons are to be fired.
7. Never fire cannon without ATC permission or when there is an aircraft within 5,000 feet.

#### Propane Cannon Operating Procedures for ATC Personnel

1. The cannons are portable, so they can be moved over time to wherever they will be most effective.
2. The cannons are activated by the remote control. The top (X10) arrow should be left pointing to zero. The bottom (X1) arrow is used to select the cannon you wish to fire. Press and release the Fire button. There is a five –second delay during which the cannon will charge and ignite propane from the attached cylinder.
3. The cannons should only be fired to displace birds/wildlife which could be a hazard to aircraft operations. Verify that the area around the cannon is clear of personnel/vehicles. Avoid firing with aircraft on base or final legs, or on the runway. Advise Base Ops prior to firing.
4. Base Ops has an identical remote control. They will request permission from the Tower before firing.
5. Base Ops should be notified (1) if a cannon is malfunctioning, or (2) if the cannons need to be moved for maximum effectiveness.

## Appendix 7

## NASA/CANG Agreement on Airfield Management

National Aeronautics and  
Space Administration  
Ames Research Center  
Moffett Field, California 94035

S. Zornetzer/200-3  
P. Fluegemann/200-9  
C. Duff/200-9  
M. Dudley/218-6  
S. Olliges/218-1  
K. Kilpatrick/218-1  
G. Tiffany/158-1  
R. Williams/158-1  
M. Sumich/237-2  
J. Beegle/244-30  
Maj J. Waldman  
Col A. Bagdasarian



September 14, 2006

To: Marvin Christensen, Deputy Center Director  
From: Lewis Braxton, Director of Center Operations  
Re: NASA/CANG agreement on airfield management issues for Moffett Federal Airfield

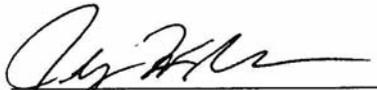
As a result of several meetings regarding airfield management issues pertaining to the Bird Aircraft Strike Hazard plan, NASA and the CANG have reached agreement on the disposition of current issues and on a plan of approach for longer term issues. The parties have resolved all open items such that a revised BASH plan and a revised JO-7 can be generated.

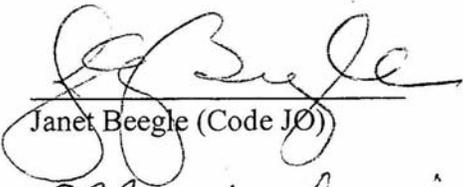
The parties have agreed that Moffett Federal Airfield is an operating airport, not a wildlife refuge. Areas that are designated as wildlife habitat will be managed as required by applicable law. All other areas will be managed in the interest of aircraft safety using all approved methods. These methods include using one way doors to move burrowing owls out of non-habitat areas during non-mating season and depredation of non-protected bird species.

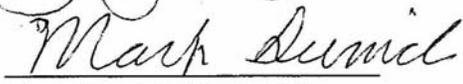
Further, we agree that the most significant pending issues for safe aircraft operations are the re-planting of the infield areas of the airfield to reduce wildlife attractants and reduce the presence of flocking birds (presently Canada Geese) on the airfield. Re-planting of three infield areas south of taxiway alpha is in the planning stages (estimated start- Nov 2006) with other infield areas to follow. A permanent full-time USDA Wildlife representative will start work on Sept 25, 2006 to actively manage the bird hazard and control the squirrel population.

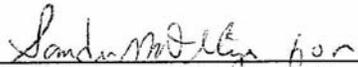
Issues that do not have significant impact on aviation safety and which require the coordination of multiple agencies will be worked as long term issues. The long term issues that we will pursue as a team include, but are not limited to: cooperation with CANG to improve and maintain the airfield utilizing joint funding if possible, pursuing the possibility of re-designation of infield wetland areas, and pursuing the possibility of movement of designated burrowing owl habitats to areas outside the aircraft movement areas.

Going forward, NASA and the CANG will hold weekly and quarterly meetings to continue this coordinated effort. The weekly meeting will be a status meeting to communicate new issues and status ongoing work. Each quarter, the Airfield Operations Board meeting will include a meeting of the Bird Hazard Working Group.

  
Maj. Jeff Waldman (CA ANG)

  
Janet Beegle (Code JO)

  
Mark Sumich (Code JO)

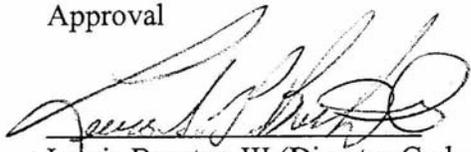
  
Kran Kilpatrick (Code QE)

Concurrence

  
Mike Dudley (Director Code Q)

  
Col. Amos Bagdasarian (Cmdr 129<sup>th</sup>)

Approval

  
Lewis Braxton III (Director Code J)